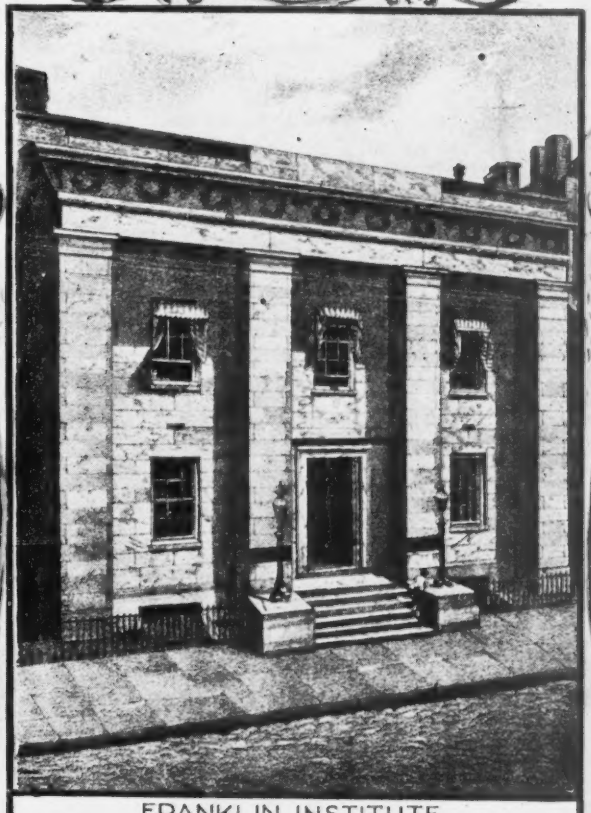
THE FOUNDRY



FRANKLIN INSTITUTE.
WHERE SOME OF THE SESSIONS WERE HELD.

AMERICAN FOUNDRYMEN'S ASSOCIATION NUMBER.

THE
FOUNDRY PUBLISHING CO
DETROIT, MICH.

VOL. VIII

NO 46

PEN. ENG. G. DET. MICH.

ESTABLISHED 1879.

WE HAVE TAKEN ADVANTAGE OF SLOW BUSINESS THE PAST TWO MONTHS TO COMPLETELY OVERHAUL OUR PLANT, AND WILL START IN FULL TIME JUNE 1st.

THE MOST COMPLETE CONCERN OF ITS KIND IN THE COUNTRY.

Our Product will be in Quality

EQUAL TO THE BEST,

And our Prices will be the Lowest.

WHEN IN NEED OF ANYTHING
THE FOUNDER USES, EXCEPTING
ONLY METAL AND FUEL,
GET OUR PRICES.

Our Royal Plumbago Ad. Last month took well. Here are a few more bargains

Radiant Brand East India Silver Lead, Three Cents per Pound.

E. I. Ingot Mold Wash, Three Cents per Pound.

The J. D. Smith Foundry Supply Co.

Foundry Equippers,
Manufacturers of
Foundry Facings,
Blackings and Supplies.

CINCINNATI, OHIO.
U. S. A.

REFINERS OF

PLUMBAGO

and Black Lead.

THE BEST IS THE CHEAPEST

WHEN YOUR FOUNDRY INTERESTS
ARE TO BE CONSIDERED

WE MANUFACTURE

THE BEST

East India Plumbago
India Silver Lead
Founders Perfect Wash
Foundry Facings
Foundry Supplies.

TRIAL SAMPLES FREE.
ALL GOODS GUARANTEED.

THE S. OBERMAYER CO.

CINCINNATI, O.

CHICAGO, ILL. LARIMER, PA. WHITE HAVEN, PA.

SOME CUPOLAS BURN OUT

More than others, and then the Maker, Melter or Foundry Foreman has to take the blame.

All this could be avoided and much expense, annoyance and profanity spared, if the Foundrymen of the country knew what some of them know, viz: that

MICA SCHIST

IS superior to anything known for the purpose of lining Cupolas, Steel Crucibles, Hot Air Furnaces, Large Ladles, etc. It burns hard under heat, and does not expand, scale off or fall out like some fire brick. It can be easily broken to size, the crumbs and small pieces mixed up with a little fire clay, and used as a mortar with which to lay up brick wall.

We can supply it in almost any required size.

Price, F. O. B. Quarrie, $1.00 to $2.00 per ton.

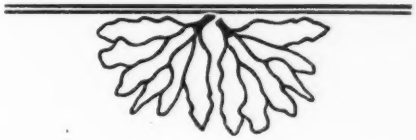
J. W. PAXSON & COMPANY,

Pier 45. **PHILADELPHIA, PA.**

Whitehead Brothers Company,

DEALERS IN

Molding Sand



FIRE SAND,
PHILADELPHIA SAND
FRENCH SAND,
FIRE CLAY, KAOLIN,
FOUNDRY FACINGS
and SUPPLIES
OF ALL KINDS.
LEAD FACINGS
A SPECIALTY.

Albany Sand for Brass and Stove Plate Casting.

537-39 West 27th St.,
NEW YORK.

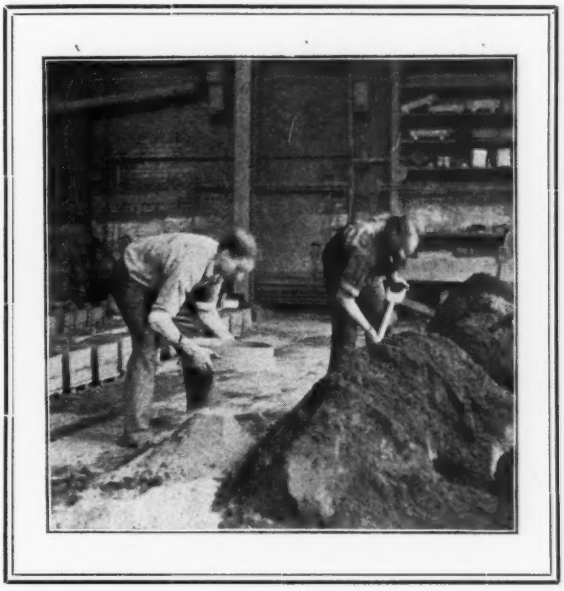
Providence Office,
42 S. Water Street.

Buffalo Office,
70 and 72 Columbia St.

WORKS AT

CHEESEQUAKE CREEK, N. J.
SOUTH RIVER, N. J.
RARITAN RIVER, N. J.
SOUTH AMBOY, N. J.
WAREHAM, MASS.
CENTRE ISLAND, L. I.
WATERFORD, N. Y.
ALBANY, N. Y.
CEDAR HILL, N. Y.
COXSACKIE, N. Y.
CLINTON POINT, N. Y.
ATHENS, N. Y.
COEYMANS, N. Y.
WILLOW SPRINGS, N. Y.
POUGHKEEPSIE, N. Y.
CRESCENT, N. Y.

TRY OUR CRUCIBLES
THEY GIVE SATISFACTION
McCULLOUGH DALZELL COMPANY.
36 ST. & A.V. RY. PITTSBURG PA.



SAND!

TO SAY THAT A MAN

"HAS NO SAND"

is to refer to him in a decidedly uncomplimentary manner. Nearly as bad to say that his sand is no good. When referring to us, however, our friends—that is to say, our customers—always grow enthusiastic. . .

THE REASON WHY

We mine and ship more sand than any concern in the Eastern or Central States is simply because, when we get a customer once, he is ours for good. We see that he gets exactly what he wants and that it's free from every kind of impurity.

SAMPLES AND PRICES GIVEN ON APPLICATION.

Twelve Years' Experience In Mining and Shipping SAND and CLAY, enables us to ship you just what you need. We can send you any grade of MOLDING SAND you may require, from the finest to the coarsest, and guarantee quality always the same. Our No. 1 Sand has no superior that we know of for Stove Plate, Hollow Ware, Grey Iron and Malleable Castings; our No. 4 is the best Sand in use for Heavy Castings of any kind. It is an extra good wearer and is always sure to turn out a perfect casting. Our Crude Plastic Fire Clay is very refractory and guaranteed to work plastic readily in water.

E. M. AYERS ✻ MARKET BLOCK, ZANESVILLE, O

Crucible.

Crucible

Dipper.

Cover.

Stopper.

Crucibles

For melting Steel, Brass, Copper, Gold, Silver, Nickel and Metals and Alloys of Every Description; Small Crucibles for making Assays and fine pure Plumbago for lubricating, etc.

We are practical workmen and have studied the requirements of the different metal works in this country, as well as in Europe. We also work strictly by chemical analysis, giving a uniformity at all times never before approached in this or any other country.

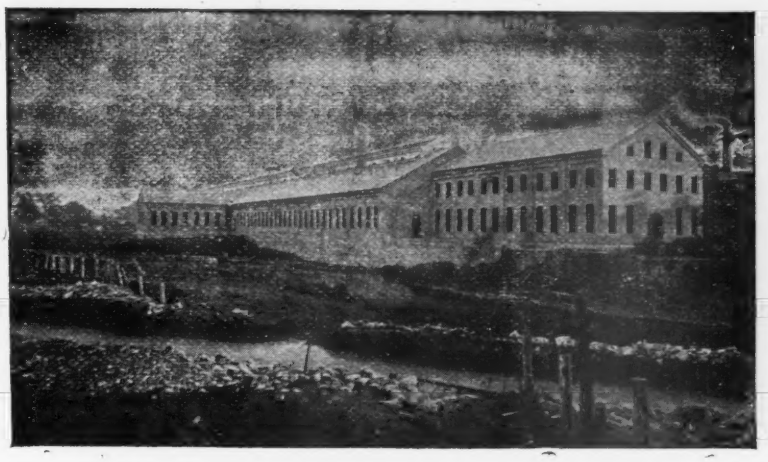
We make All Sizes, from 8 oz. to 2 ton Capacity.

ROBT. J. TAYLOR & SON,

1900 to 1916 CALLOW HILL STREET, PHILADELPHIA, PA.

Wrought Iron Bridge Co.,

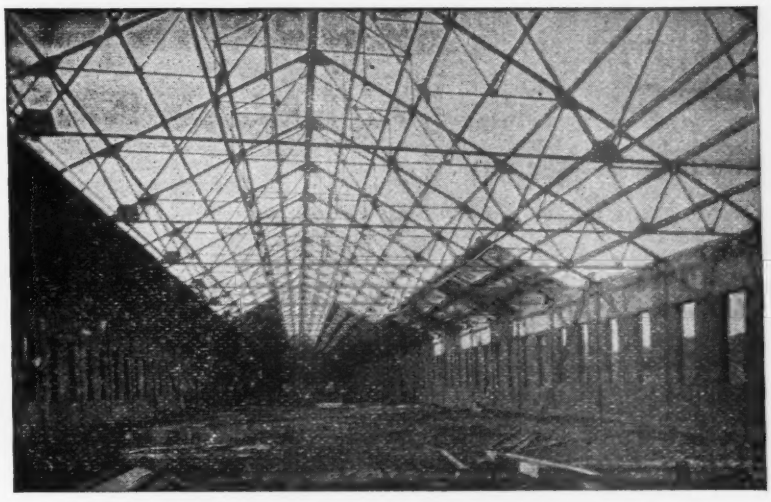
DESIGNERS AND BUILDERS IN
IRON AND STEEL
FIRE PROOF BUILDINGS



FOUNDRIES, MACHINE SHOPS
—FOR—
ETC., ETC.

Exterior of Foundry of Warder, Bushnell & Glessner Co., Springfield, Ohio.

Traveling and Jib Cranes for handling
Heavy Castings and Machinery.



Buildings Designed for Special
Requirements.

Interior Foundry Building of Warder, Bushnell & Glessner Co., Springfield, Ohio.

The roof of this building was erected by the Wrought Iron Bridge Co., Canton, Ohio, and consists of steel trusses supporting wooden purlins to which matched and dressed sheeting is nailed for slating. Trusses being 18 ft. above the floor, the wood work of roof is out of danger from fire, while the cover being of slate a suitable cornice to protect the overhanging of roof from flying sparks, or heat from the burning of neighboring buildings, renders this structure absolutely fire proof, Windows are set in the sides of ventilator throughout its entire length, so that ample light and ventilation is insured.

Wrought Iron Bridge Co.

ADDRESS NEAREST OFFICE.

CANTON, O. KANSAS CITY, MO. CHICAGO, ILL.

136 Liberty St., NEW YORK.

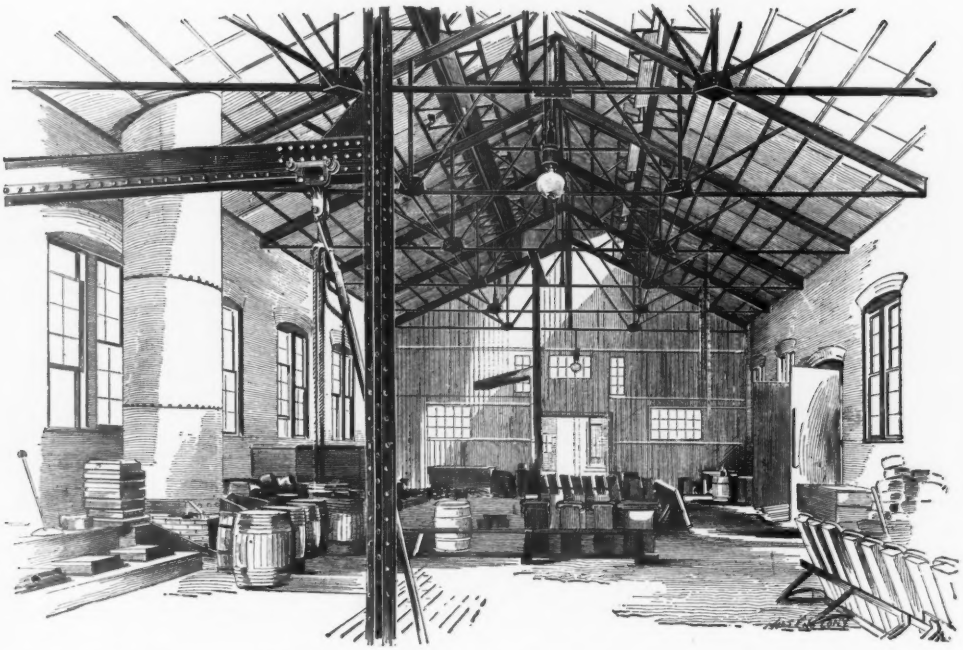
CHAS. M. JARVIS, President and Chief Engineer. BURR K. FIELD, Vice-President.
GEO. H. SAGE, Secretary F. L. WILCOX, Treasurer.

THE BERLIN IRON BRIDGE CO.,

ENGINEERS, ARCHITECTS

—AND BUILDERS OF—

Iron and Steel Bridges, Roofs and Buildings.



The above illustration is taken direct from a photograph, and shows the interior construction of an iron casting shop designed and built by us for the Waterbury Brass Company at Waterbury, Conn. The building is 52 feet in width by 110 feet in length, and built entirely of iron, that is, iron sides and iron roof. The danger from fire in a brass casting shop is very great, and a construction of this kind eliminates this danger entirely.

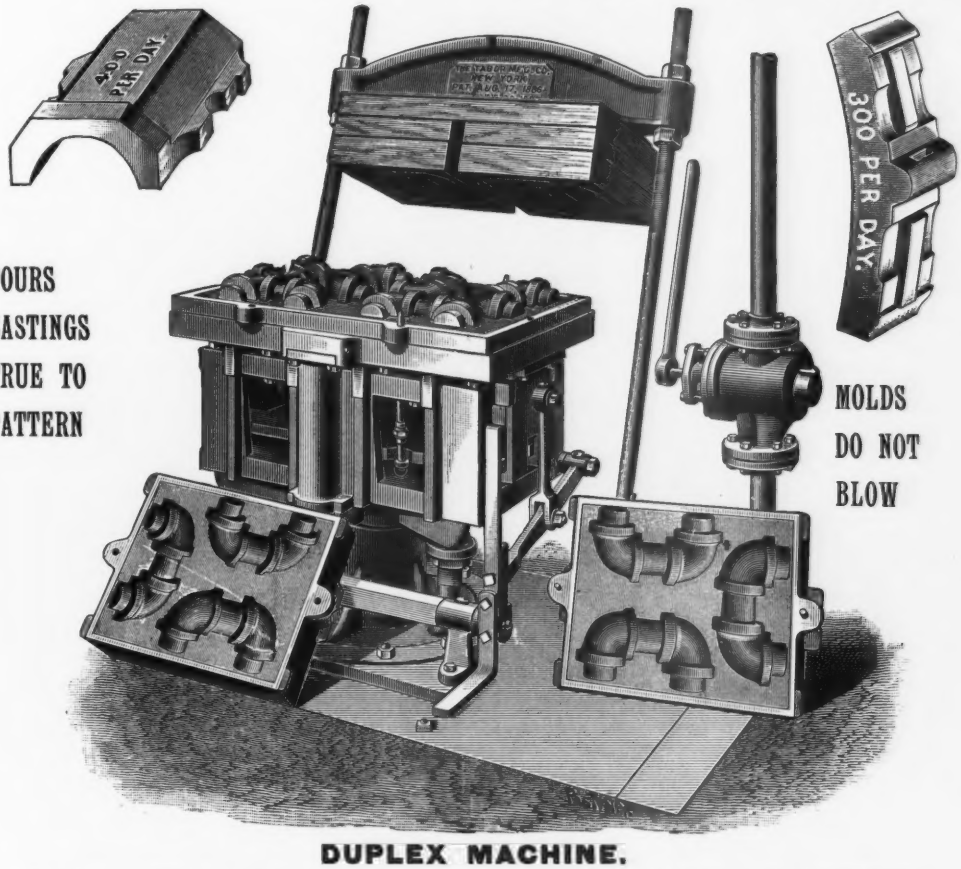
Office and Works, - - EAST BERLIN, CONN.

SEND FOR ILLUSTRATED CATALOGUE.

ONE MAN'S WORK

—WITH THE—

TABOR AUTOMATIC MOLDING MACHINE



POURS CASTINGS TRUE TO PATTERN

MOLDS DO NOT BLOW

DUPLEX MACHINE.

Molds both parts of flask at one operation of machine, thus making two machines in one.

These machines are adapted to general castings when made in reasonable quantities.

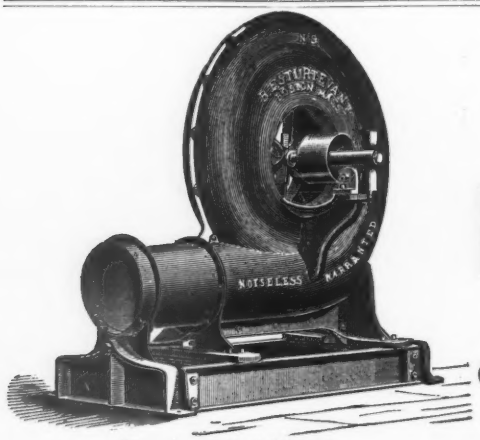
The use of these machines is a guarantee of economy, greater quantity and better quality in castings.

Foundrymen who are interested in producing cheap castings of superior quality are invited to correspond with the Company and call at the works, Front and Franklin Streets, Elizabeth N. J., and see the machines in operation.

The Tabor Manufacturing Co.

OFFICE AND WORKS—
FRONT AND FRANKLIN STS.

Elizabeth, N. J.



Blower on Adjustable Bed.

THE STURTEVANT STEEL Pressure Blowers,

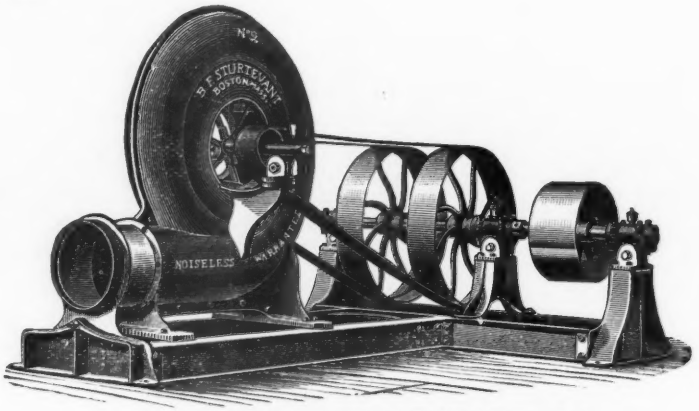
—FOR—

Cupola Furnaces and Forge Fires.

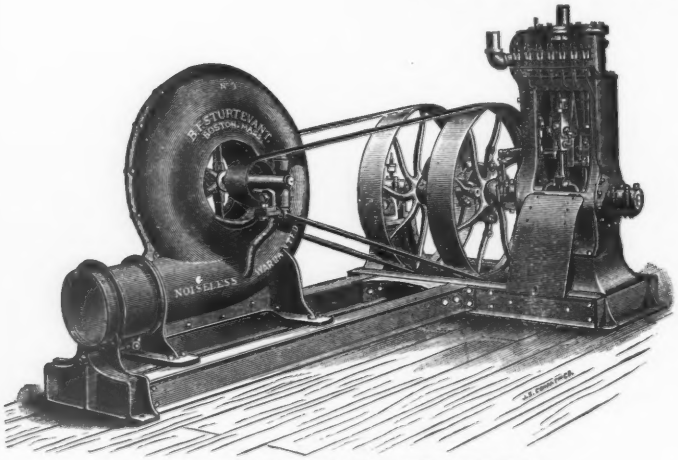
BLOWERS

Furnished without Bed with Separate Countershaft

BLAST GATES



Blower on Adjustable Bed with Combined Countershaft.



Blower on Adjustable Bed with Double Enclosed Engine.

BLOWERS

WITH

THE STURTEVANT

Direct Connected

Electric Motors

Send for Catalogue.

B. F. STURTEVANT CO.,

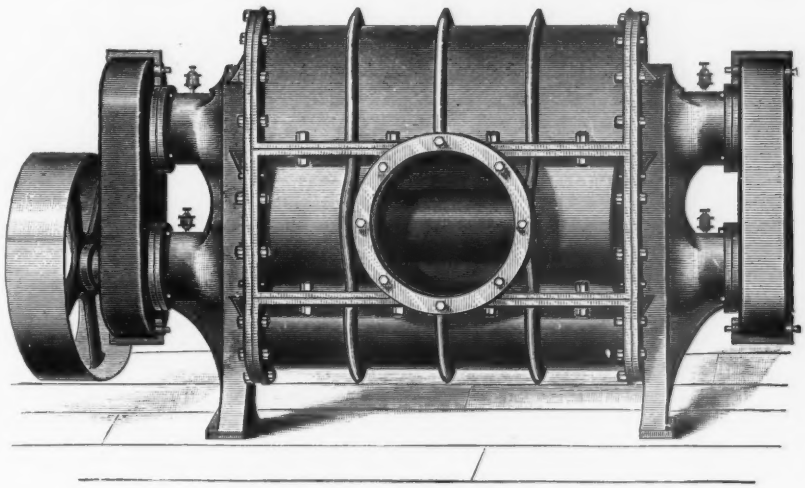
BOSTON, MASS.

91 Liberty Street, NEW YORK. 135 N. Third St. PHILADELPHIA.
16 S. Canal St. CHICAGO. 75 Queen Victoria St. LONDON.

STOCK CARRIED AT BRANCHES.

The Green Rotary Pressure Blower

GIVES THE MOST AIR FOR A $.



Working parts are two perfectly balanced impellers, mounted on the best steel shafts, running in bronze bushes, cut gearing at both ends of the Blower enclosed in oil-tight casing.

Weighs less, occupies less space, costs less for freight than any other POSITIVE BLOWER in existance.

GIVES THE MOST AIR FOR A $.

SEND FOR CATALOGUE.

Wilbraham Baker Blower Co.,

2518 Frankford Ave., PHILADELPHIA, PA.

P. G. COCHRAN, Pres.
J. R. LAUGHREY, Treas.
JOHN H. WURTZ, Secretary
J. S. NEWMYER, Mgr.

Washington Coal & Coke Co

(CAPITAL PAID-UP $250,000.)

MANUFACTURERS OF

HIGH GRADE COKE

We Make a specialty of 72 Hour
Foundry Coke.

N. P. HYNDMAN, Sales Agent,

Room 8, Conestoga Building, 7 Wood St.

General Office, DAWSON, PA.

PITTSBURG, PA.

DIRECTORY OF LEADING PIG IRON DEALERS.

HUGH W. ADAMS & CO.

Pig Iron Merchants

15 Beekman Street, NEW YORK

Boston Office, 85 Water Street

HENRY H. ADAMS & CO.

(Incorporated)

PIG IRON

Sole Agents for the Celebrated "NORWAY," for combined Strength and Softness.

177 Broadway,
NEW YORK CITY, N. Y.

MATTHEW ADDY & CO.

CINCINNATI, ST. LOUIS.

Agencies,

Chicago, Detroit, New York,
Philadelphia.

THE DOMHOFF & JOYCE CO.

PIG IRON COMMISSION,

CINCINNATI.

CLINTON IRON & STEEL CO.

Manufacturers of the

CLINTON INSPECTED FOUNDRY IRON

CELEBRATED "CLINTON" SOFTENER

PITTSBURG, PA

15 Cortlandt St., NEW YORK.

DAYTON COAL & IRON CO.

(Limited.)

PIG IRON,

DAYTON, Tenn. CINCINNATI, Ohio.

F. A. GOODRICH & CO.

Incorporated

PIG IRON, STEEL, COKE, ETC.

Detroit, Mich.

THE MARSHALL IRON

An old fashioned Pennsylvania Iron for high grade machinery.

The Juniata Furnace & Foundry Co.

Beach & Marlborough Sts.,

C. T. Holbrook, Sole Agent. PHILADELPHIA.

MILLER, WAGONER & BENTLEY,

PIG IRON,

Steel, Ore, Coke and Cinder.

Long Distance Telephone No. 842. COLUMBUS, OHIO.

PICKANDS, BROWN & CO.,

Manufacturers, Importers and Dealers in

PIG IRON AND IRON ORE.

Rookery Building, CHICAGO.

ROGERS, BROWN & CO.

CINCINNATI, CHICAGO,

BUFFALO,

PHILADELPHIA, NEW YORK,

ST. LOUIS

SLOSS IRON & STEEL CO.

BIRMINGHAM, ALA.

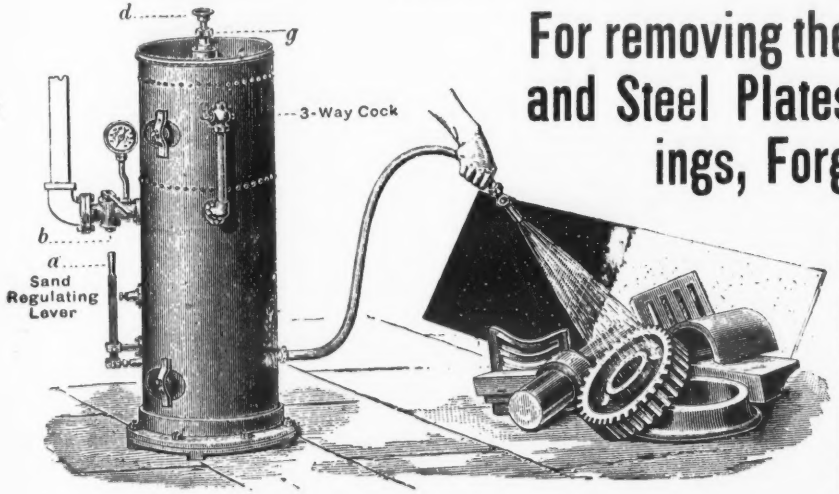
SLOSS PIG IRON

D. L. Cobb, Sales Agent

1145 Monadnock Block, CHICAGO, ILL

Improved Patent Sand Blast Machinery.

TILGHMAN'S PATENTS. MATHEWSON'S PATENTS.



For removing the Scale from Iron and Steel Plates, Cleaning Castings, Forgings, Etc.

By the use of common, sharp, dry sand, and with compressed air at from 10 to 15 lbs. pressure to the square inch to propel the sand, this Machinery will **CLEAN** all forms of castings (from the very largest weighing several tons to the smallest) **more thoroughly** than is possible by hand, at **half the total cost**, and in a space of time that cannot be conceived until the Machinery has been seen in actual operation.

For small castings, a Special Tumbling Barrel (as shown herewith) is used in connection with the Sand Blast Apparatus where the Blast is directed through one or both ends of the Cylinder against the articles placed therein. The work being done by contact of grains of sand traveling at a high velocity, no portion of the surface of the castings can escape the action of the Blast, still in consequence of the slow revolutions of the Barrel and the shortness of the operation, the sharp outlines of the castings are well preserved.

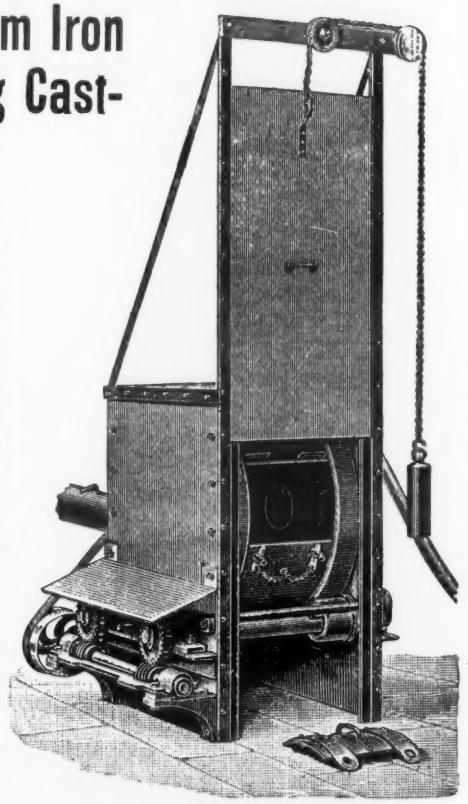
The Air Compressor and Air Tank used in connection with this Machinery are especially designed to supply, most economically and satisfactorily, the requisite amount of free air at the required pressure.

FOR FURTHER PARTICULARS, ADDRESS

WARD & NASH,

SOLE AGENTS.

23-25 PURCHASE ST., BOSTON. **35-37 S. CANAL ST., CHICAGO.**



Barrel.

The Edw. P. Allis Co.

Milwaukee, Wis. have the largest foundry (exclusively for machinery castings,) in the United States. Its interior is shown by the following cut. . . . .

The daily melt is from 60 to 90 tons. All the heavy work is done under and handled by **THREE** thirty ton

Shaw Electric Traveling Cranes,

The first of which was put in operation in 1889, the second in 1891 and the third in 1893. Besides these, there are three more Shaw Cranes in the erecting and machine shops.

These Crane are Made Only by

THE SHAW ELECTRIC CRANE CO.

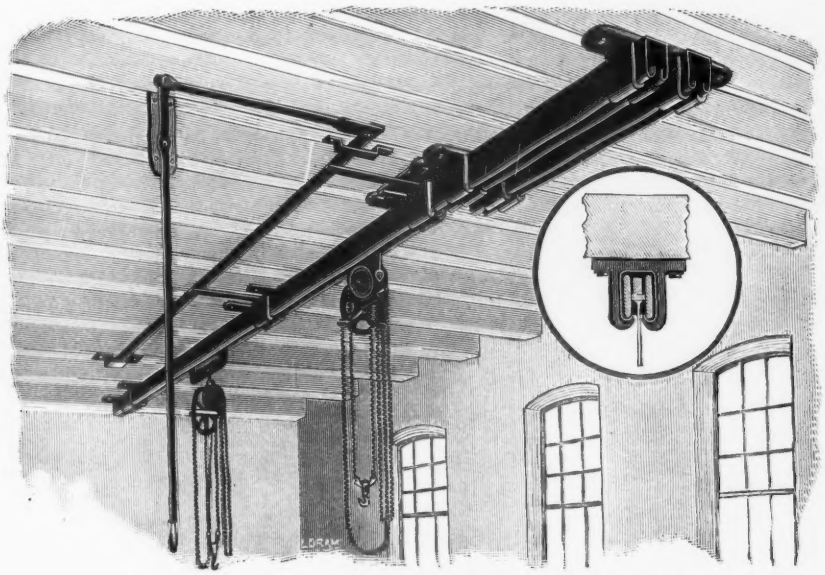
MUSKEGON, MICH.

——And Sold Only by——

Manning, Maxwell & Moore,

424 TELEPHONE BUILDING, PITTSBURG.

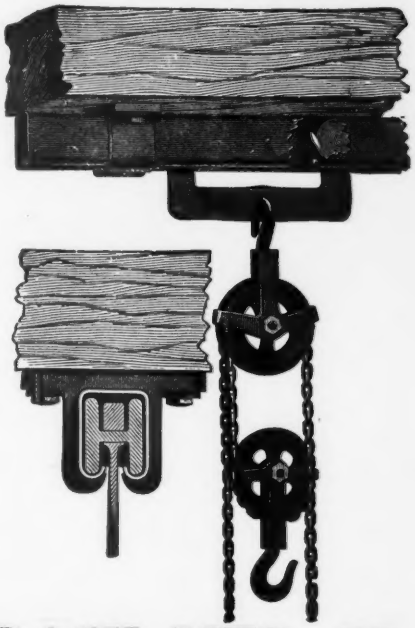
60 S. CANAL ST., CHICAGO, ILL. **111 LIBERTY ST., NEW YORK.**



THE PATENT

Overhead Trolley Track System

Is the coming improvement in the iron foundries of this country and in many cases can be made to pay for itself in a few months.



Just the thing for

Carrying Iron from Cupola to Floors.
Carrying Castings from Floors to Cleaning Rooms. . . . .
Lifting, Rolling or Moving Flasks. .

All who have adopted this system have expressed themselves as being delighted with it.

Write us for Circulars, Estimates and Full Particulars.

COBURN TROLLEY TRACK MFG. CO.

HOLYOKE, MASS.

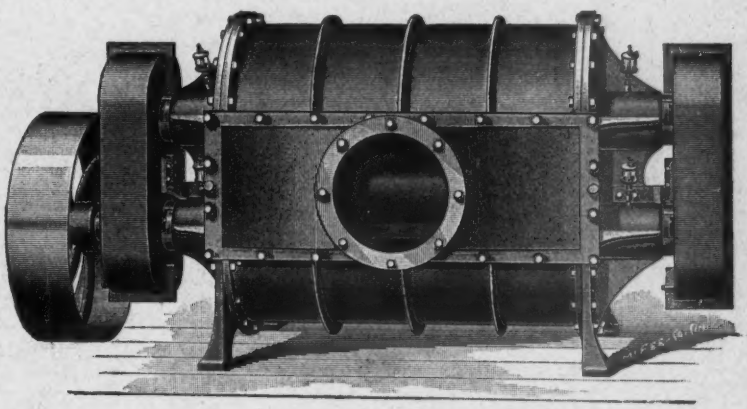
OVER

25,000

ROOTS' POSITIVE PRESSURE BLOWERS

Have been put on the Market.

1859



1896

They are Unequaled.

P. H. & F. M. ROOTS CO.

CONNERSVILLE, IND.

Just Enough Wind

∴ ∵ ∴ and at the right pressure for the best results is what you obtain with a

ROOTS' POSITIVE PRESSURE BLOWER

OUR CATALOGUE is interesting.
OUR TESTIMONIAL SHEET convincing.

WRITE FOR THEM

SATISFACTORY IN EVERY RESPECT. NO COST FOR REPAIRS.

DAYTON, OHIO, February 26th, 1895.

P. H. & F. M. ROOTS CO., Connersville, Ind.:

Gentlemen—It gives us great pleasure to comply with your request for a statement of our experience with your Blower. We are using a No. 5 Blower driven by belt, and it is melting eight tons per hour in a forty-inch Collian cupola. We think it safe to state, however, that the Blower would easily furnish sufficient wind to melt ten tons per hour. We have had it in use about three years, during which time it has cost us nothing for repairs, and we have found it very satisfactory in every respect.

Wishing you the continued success, which the good qualities of your machinery merit, we remain,

Yours truly,
THE STILLWELL-BIERCE & SMITH-VAILE CO.
By G. N. Bierce, Secretary.

NOT A PENNY FOR REPAIRS AND IN DAILY USE SINCE PURCHASED IN 1887.

MILWAUKEE, WIS., April 23, 1895.

P. H. & F. M. ROOTS CO., Connersville, Ind.:

Gentlemen—We are pleased to say that what we said on the 30th of December, 1887, is equally true at this date, as we have not spent a penny on the machine for repairs up to this time. The machine has been in daily use since purchased in 1887.

Yours truly,
THE EDWARD P. ALLIS CO.,
By Edwin Reynolds, Supt.

GIVES ENTIRE SATISFACTION.

HAMILTON, OHIO, May 8, 1895.

P. H. & F. M. ROOTS CO., Connersville, Ind.:

Gentlemen—We have been using Roots Blowers in our foundry since 1873, having put in larger ones from time to time. The present Blower, No. 6, has been in use for twelve years and is still working to our entire satisfaction. It is efficient, well built and has cost nothing for repairs since it was put in.

Yours truly,
THE NILES TOOL WORKS CO.,
R. C. McKinney, Treas. and Gen. Mgr.

P. H. & F. M. ROOTS CO.

Connersville, Ind

THE GREATEST MONEY SAVER
EVER OFFERED THE
FOUNDRY TRADE.

..King's Patent Sand Blast..

Every up-to-date foundryman knows the value of a sand blast for casting cleaning purposes. If he does not he is behind the times. The apparatus we furnish is the cheapest and best for either machinery or stove plate.

For cleaning Steel Castings it is invaluable. Stove Castings cleaned by it can be placed directly in the nickeling bath.

Pays for its cost in one month.

PRICE, $75.00

F. A. GOODRICH & CO.

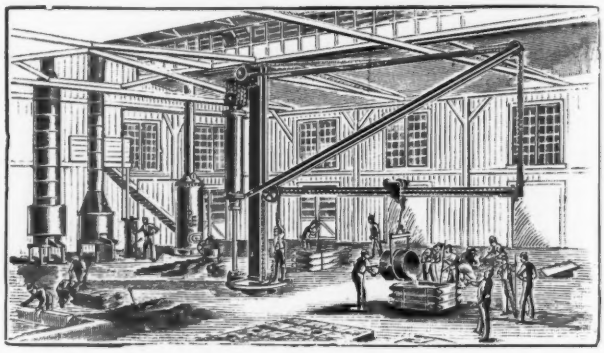
CHAMBER OF COMMERCE
DETROIT, MICH.

EVER THAT SAME OLD WAIL

"CAN'T GET A NEW DOLLAR FOR AN OLD ONE"

Crowdin' you hard in prices, aren't they? Well, if you were smart enough to just half realize what a difference in your profits the Ridgway Balanced Steam-Hydraulic Crane in your foundry would make, the question with you wouldn't be, "I wonder if that Ridgway man tells the truth?" but, "Ridgway, my dear boy, how quick can we get the crane?"

Now, simply as a pointer, there's

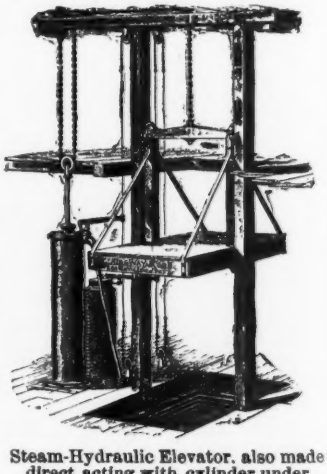


5-ton Steam-Hydraulic Crane in a Foundry.

The Henry McShane Mfg. Co.,

of Baltimore, Md. This is one of the newest and largest foundries in the land. You will believe it must be big when we tell you that one of their cupolas melts 30 tons per hour. Takes some orders to keep ahead of a cupola like that, don't it? However, no use of a long story. Of course this concern has adopted the Ridgway Crane. Establishments like this are run by men who know a thing or two. No, we never went near them. Never bothered them to buy the Ridgway Crane, anymore than we have bothered you. They did their own investigating, with the usual result and the same old cry goes up—"Ridgway, hurry!"

When a foundryman finds out that two molders with a Ridgway Crane can do as much work as three molders with other cranes, you don't have to waste car fare and eloquence on that man. And you—there you go moping around with your heart down in your boots, growling about prices, blaming the hard times—your only approach to joy being a longing look toward the elections next fall, "when the Republicans are going to sweep the country with McKinley, and business is going to boom; prices are going to jump; and you will get 4 cents a pound for your castings like you used to, and any old plug of a foundry will make money and—never, my boy, never. That day has gone and gone for good. Your only salvation is right now and with this wonderful Ridgway Crane. Of course, you don't believe that, but the sooner you find it out the better for your pocket-book.



Steam-Hydraulic Elevator, also made direct acting with cylinder under platform.

"PLEASE TAKE THE ELEVATOR."

People who want a good one do.

CRAIG RIDGWAY & SON, COATESVILLE, PA.

JOHN J. SHIPHERD, Pres. W. RUSSELL, Vice-Pres. and Mgr.
L. C. SHIPHERD, Sec'y and Treas.

THE

Phoenix Iron Works Co.

The following is a letter which was sent to us unasked for and is a sample of many genuine indorsements which we receive very frequently.

OFFICE OF
BERT. L. BALDWIN, M. E.
CINCINNATI, O.

PHOENIX IRON WORKS CO.
CLEVELAND, OHIO.

GENTLEMEN—As you may remember, you furnished a 10 ton traveling Crane which was erected at the Cummingsville Generating Station for the Cincinnati Street Ry. Co. This crane was erected for the purpose of handling the heavy parts of the Railway Generators. The easy working of this crane was appreciated by the party, who had the contract for erecting the generator, who found that where it required eight men at the hoisting chain of one of our other cranes, it only required three at your crane, with both cranes handling the same load. All of the details on this crane are well worked out and substantial, so that I expect that it will continue to give us the best satisfaction.

Yours respectfully,
(Signed) BERT L. BALDWIN.

MANUFACTURERS

Hand, Steam, Belt, Hydraulic and Electric Cranes

FOR ALL PURPOSES.

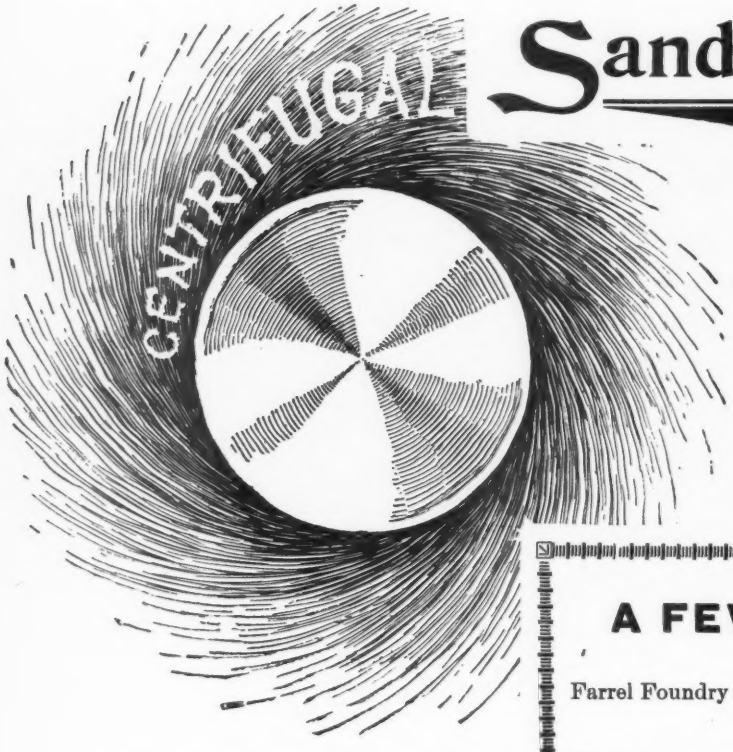
Foundry Ladles, Chains, and General Machinery

WASON STREET.

CORRESPONDENCE SOLICITED.
WRITE FOR CATALOGUE.

CLEVELAND, OHIO.

Eastern Office: HARRY W. JENNING, Agt., Fulton and Cliff sts. NEW YORK, N. Y.
New England Office: THE JOHN WALE CO., 139 and 141 High St. BOSTON, MASS.
CHICAGO OFFICE, 1430 OLD COLONY BUILDING.



Sand Mixer

IT IS
EFFECTIVE.
EXPEDITIOUS.
ECONOMICAL.

IT SAVES
TIME
LABOR
MONEY

A new, simple and practical method of **preparing Sand for Molds or Cores,** superseding the old time methods of drying and riddling. Damp Sand is in just the proper condition for working.

The saving in labor alone soon repays the cost of the apparatus.

The Capacity depends entirely upon the facilities for feeding sand into the hopper, this may exceed 10 tons an hour. Two men will easily shovel 5 tons an hour by hand into the machine. One handling is, in ordinary work, all that is requisite.

A FEW USERS:

Farrel Foundry & Machine Co.,
Ansonia, Conn.

Westinghouse Air Brake Co.,
Wilmerding, Pa.

I. P. Morris & Co.,
Phila, Pa.

McConway & Torley Co.,
Pittsburgh, Pa.

Deane Steam Pump Co.,
Holyoke, Mass.

Erie Malleable Iron Co.,
Erie, Pa.

E. Chicago Foundry Co.,
E. Chicago, Ind.

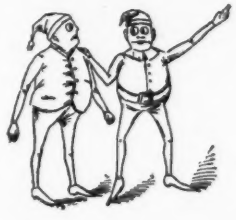
Maher & Flockhart,
Newark, N. J.

} Machines now building.

William Sellers & Co., Incorp.

PHILADELPHIA.

Cupola Furnaces
Blowers
Cranes
Compressors
Hoists
Elevators
Foundry and
Core Oven Cars
Ladles
Reservoirs

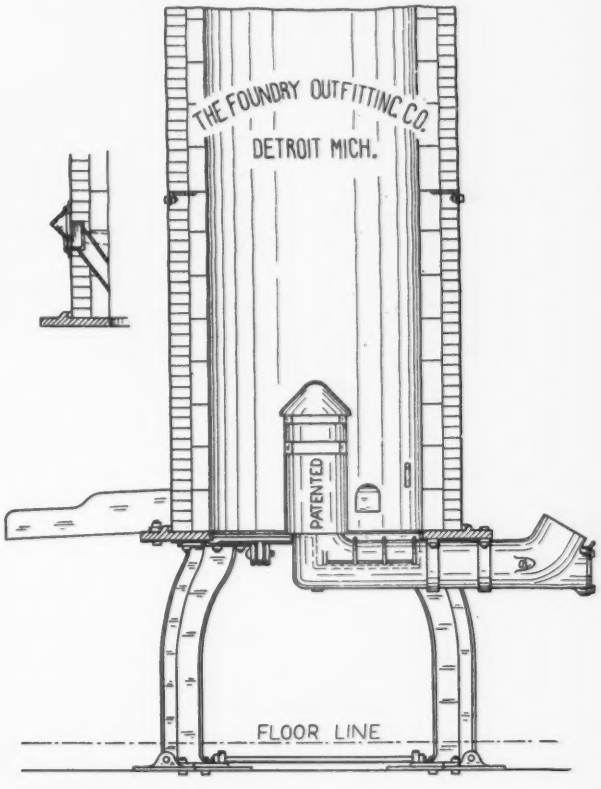


Tumbling Mills
Core Ovens
Sand Sifters
Brass Furnaces
Testing Machines
Trolley Tracks
Foundry Lights
Flasks
Fire Brick
Fire Clay
Molding Sand

There was a Time

When a few people were rather inclined to make light of the Center Blast Cupola, but that period is now ancient history.

We confidently predict that inside of two years no American Foundryman will think of buying anything else, and those that have, will wish they had taken our advice.



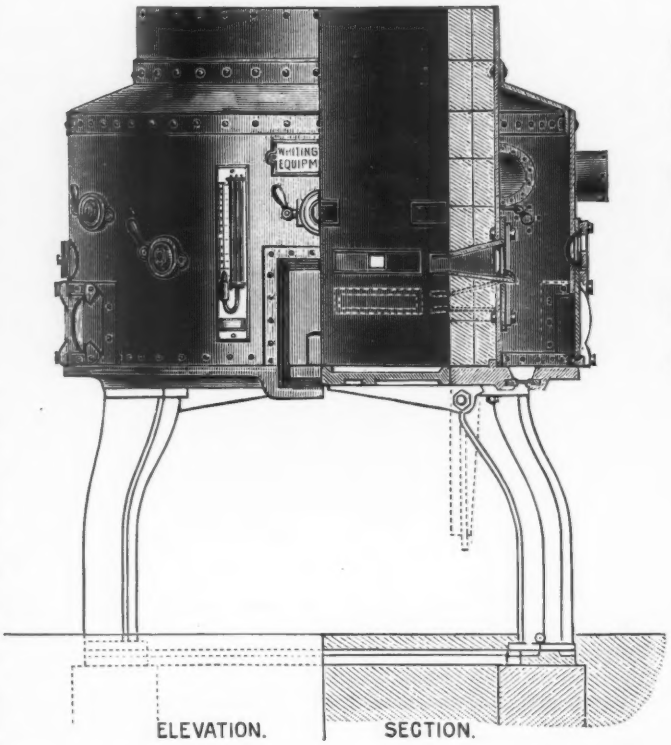
We will Go Further

They will not be able to buy anything else; no other kind will be made. If you are interested in foundry matters, you will watch this. We have made several recent improvements and know that the Crandall Cupola with **Johnson's Center Blast Attachment** will melt More and Hotter Iron, quicker than any of the old style, uses less Fuel and Blast, and is a money saver and money maker from the start.

The Foundry Outfitting Co.

DETROIT, MICH.

COMPLETE
FOUNDRY EQUIPMENT



Ladles
Trucks
Elevators
Tumblers
Sand Sifters
Turn Tables

The Whiting Cupola.

ADOPTED by over three hundred high-class Foundries. Unexcelled for fuel economy and all-round efficiency. A rapid melter. Saves lining. Gives hot iron. No experiment—an established success. Fourteen sizes. Send for circulars and our new prices. A good time to buy.

IMPROVED

Air Hoists and Cranes

"TYPE A" Hoist, for Foundry use, has an adjustable speed valve. The load may be held under pressure in any position. Patent exhaust attachment. Safety check. All sizes. Send for prices and circulars.

Whiting Foundry Equipment Co.

WORKS: Harvey, Ill. CHICAGO OFFICE: 1522 Monadnock Block.

THE FOUNDRY

VOL. 7. DETROIT, MICH., JUNE, 1896. No. 46

THE AMERICAN FOUNDRYMEN'S ASSOCIATION!

Organized at Philadelphia June 12, 13 and 14.

MEETING A GRAND SUCCESS IN EVERY WAY

Those in Attendance were Enthusiastic concerning the Good Work Accomplished and Delighted with the Entertainment Received.

Philadelphia was the only city in which to hold the meeting that was to witness the formation of an American Foundrymen's Association.

This is not a "National Association," because that might carry with it the intimation that its membership was to be confined to the United States, while it is hoped that the large number of foundrymen, many of them prominent in their line and located in Canada, will be induced to join with us and make it what its name implies, thoroughly "American."

In no other city in the world could such a representative gathering of foundrymen have been got together, and those present often expressed themselves as feeling that elsewhere it could not have been anything like the success it was in the City of Brotherly Love.

As Mayor Warwick so eloquently pointed out in his welcoming speech, that there "in a few short blocks of the spot where this great country was 'founded' they could appropriately 'found' a Foundrymen's Association;" that there where our National Constitution was "cast," we could wisely "mold" a constitution to govern our new association.

Then again it was there that the first local association was organized, it was there the pioneers in this great movement lived, and it was felt on all sides that the surroundings and influences were of such a nature as to make success easy.

The same gentlemen who had been the pioneers in the original Philadelphia association, who had been its officers almost ever since, were on hand to welcome those attending, little realizing that these delegates were familiar with their names and their works and looked forward with the most pleasant anticipations to meeting those who had made such a gathering possible.

Long before the time for calling the meeting to order, in fact two days before, there commenced to arrive at the hotel headquarters and the Manufacturers' Club a few representative foundrymen whose number began to rapidly swell until at times the rooms alloted for them were crowded and the genial Chas. T. Holbrook, who had charge of the registration and knew everybody, was kept busy from early morning until late at night of the last day.

As fast as a visitor registered he was given a badge with a number that corresponded with his number as it appeared on the register, and by referring to the printed list as it appeared each day in The Daily Foundry, a stranger could easily identify anyone and discover at the same time their residence and business affiliation.

It will be seen from the large number present, some of them from distant points, that it was a thoroughly representative gathering.

Stove, machinery, radiator, malleable and agricultural men mingled together and

seemed to enjoy hugely the opportunity it gave them to make each other's acquaintance. The presidents of large foundry corporations found delight in making the acquaintance of gentlemen from other parts of the country who they knew well enough by reputation previously, while there were many instances of those who had charge of large shops at distant points meeting for the first time men similarly engaged that had known each other by reputation for ten or twenty years. As a social gathering alone its success could not be overestimated or overstated, and from the first to the last every individual there enjoyed himself and all went home feeling that it was one of the most pleasant events of their lives.

But this meeting was not convened for the sake of the social pleasures that might be participated in by those who attended it, it had a business purpose in view and meant business from start to finish.

The hearty, unanimous way in which they went at the work of forming the American Foundrymen's Association showed plainly enough that they were in earnest and intended to see to it that a Foundrymen's Association that would be a credit to all concerned should be the result of the gathering.

As might be expected, the discussions were lively at times when the debate hinged upon details connected with the methods to be followed in conducting the affairs of the new society, but they indicated by their very earnestness how thoroughly aroused and sincere every one present was in desiring that the constitution of the new association should be as flawless as possible and that every feasible plan should be adopted that would contribute towards making it the success all desired to see.

Too much praise cannot be given Philadelphia foundrymen and the officers of the Philadelphia Association for the work done by them towards providing the means and afterwards advertising and inviting the foundry trade of the entire country to be present. The arranging for headquarters, securing railroad rates and attending to the thousand and one details connected with the meeting were all largely attended to by that embodiment of energy and good nature, the genial secretary of the Philadelphia association, Mr. H. Evans. This gentleman is likely to live to see his own monument erected (a distinction accorded to but few men in this world), in the shape of a Foundrymen's Association that is likely to make its influence felt in a way that may surprise some of even its most sanguine friends. Then those gentlemen who contributed papers and helped to make the meetings so interesting are deserving of especial mention.

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Allen, Geo. R., Thirteenth and Buttonwood streets, Philadelphia, Pa.

Amsden, Alonzo D., Phoenix Foundry, Providence, R. I.

Adams, Wm., Wm. Adams & Co., Ninth and Girard avenue, Philadelphia.

Arrote, Jas. W., Jr., Standard Mfg. Co., Pittsburg, Pa.

Ackerman, Wm. W., Sam'l L. Moore & Sons, Elizabethport, N. J.

Adams, E. T., Juniata Furnace & Foundry Co., Marlborough and Beach streets, Philadelphia.

Anderson James, Sotter Bros., Pottstown, Pa.

B.

Bougher, J. K., J. W. Paxson & Co., Philadelphia.

Braun, John, Philadelphia Lawn Mower Co., Twenty-third and Turner streets, Philadelphia.

Blankley, Jas. H., Blankley Bros. & Co., Twenty-second and Allegheny avenue, Philadelphia.

Brown, Elmer E., E. E. Brown & Co., McKean and Meadow streets, Philadelphia.

Brown, John T., Damascus Bronze Co., Pittsburg, Pa.

Banholzer, Andrew, Birmingham Machine & Foundry Co., Birmingham, Ala.

Bishop, T. S., Russell & Irwin Mfg. Co., New Britain, Conn.

Burgen, J. J., Lane Mfg. Co., Montpelier, Vt.

Burr, John W., Burr & Houston Co., Brooklyn, N. Y.

Beckett, Jas. A., W. A. Wood Mowing & Reaping Co., Hoosick Falls, N. Y.

Buckley, Clinton S., Damascus Bronze Co., Pittsburg, Pa.

Best, Jos., Warden, King & Son, Montreal, Canada.
Brayer, Jno. F., Co-operative Foundry Co., Rochester, N. Y.
Bing, J. Howard, 3737 Filbert street, Philadelphia.
Brayer, Frank N., Co-operative Foundry Co., Rochester, N. Y.
Brooksbank, F. C., Ward & Nash, Riverton, N. J.
Brown, Felix, Jr., A. & F. Brown, Elizabethport, N. J.
Berge, R. D., Clinton Iron & Steel Co., New York City, N. Y.
Bailey, James, Wilmington Mal. Iron Co., Wilmington, Del.
Barba, W. P., Midvale Steel Co., Nicetown, Philadelphia.
Baird, C. R., C. R. Baird & Co., Philadelphia.
Bell, C. S., The C. S. Bell Co., Hillsboro, O.
Buckwalter, J. A., The Buckwalter Stove Co., Royersford, Pa.
Blyth, Robt., Walker Pratt Mfg. Co., Watertown, Mass.
Bradshaw, Jas. T., Twenty-first and Diamond streets, Philadelphia.
Booth, J. W., American Steel Casting Co., Thurlow, Pa.
Blackburn, A. H , Fuel Economizer Co., Matteawan, N. Y.
Barlow, A. E., Morris & Barlow, Newark, N. J.
Bailey, Charles, Reliance Steel Casting Co., Pittsburg, Pa.
Birkinbine, John, 25 N. E. Penn Square, Philadelphia.
Buckwalter, T. D., Buckwalter Stove Co., Royersford, Pa.
Bement, Wm. P., Bement, Miles & Co., Philadelphia.
Bate, Richard H., W. T. Bate & Son, Conshohocken, Pa.
Blickenderfer, R., Lancaster, Pa.
Bates, Hy. G., New York City, N. Y.
Brown Albert D., Chester, Pa.
Brown, Archer, Rogers, Brown & Warner, New York.
Brown, Charles, A. & F. Brown, Elizabethport, N. J.
Borgner, Cyrus, Twenty-third and Vine sts., Philadelphia.
Betts, E. T., Betts Machine Co., Wilmington, Del.

C.

Coane, W. J., Jos. Dixon Crucible Co., 38 N. Fourth street, Philadelphia.
Caskey, Robt., Diller, Caskey & Co., Sixth and Berks streets, Philadelphia.
Cox, Mr., Cramp's Brass Foundry, Philadelphia.
Campbell, Twining, Paterson, N. J.
Cullingworth, J. R., Robt. Wetherill & Co., Chester, Pa.
Coggeshell, T. R., Girard College, Philadelphia.
Cook, F. E., Westinghouse Air Brake Co., Pittsburg, Pa.
Choate, Chas. N., Bridgeport Door, Bronze & Metal Co., Bridgeport, Conn.
Colvin, Theo. H., Providence, R. I.
Cox, Justice, Jr., 218 S. Fourth street, Philadelphia.
Carleton A. C., Pratt & Whitney Co., Hartford, Conn.
Cheney, W. W., S. Cheney & Son, Manlius, N. Y.
Carpenter, Wm. H., A. Carpenter & Sons, Providence, R. I.
Coffin, W. H., Buffalo Fdy. Supply Co., Buffalo, N. Y.
Carpenter, H. A., A. Carpenter & Sons, Providence, R. I.
Curtin, A. G., L. & R. Wister & Co., Philadelphia.
Caldwell, A. J., Hy. R. Worthington, New York.
Cramp, Chas. D., Wm. Cramp & Sons, Philadelphia.
Cruickshank, W. Y., Jackson & Woodin Manufacturing Co., Berwick, Pa.
Codington, L. M., Standard Gas Fixture Co., Somerville, N. J.
Carr Millard F, J. W. Parson & Co., Philadelphia.

D.

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Dette, Wm., Rogers, Brown & Warner, Bullitt building, Philadelphia.
Darke, J. M., General Electric Co., Lynn, Mass.
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Dalton, J. H., Walburn, Swenson & Co., Chicago, Ill.
Devlin, Walter, Philadelphia Hardware and Malleable Iron Co., Philadelphia.
Dimond, Hy. C., Warder, Bushwell & Glessner, Springfield, O.

Donaldson, J. F., Ingersoll, Sergeant Drill Co., Easton, Pa.
Devlin, W. J., Philadelphia Hardware and Malleable Iron Works, Ninth and Jefferson streets, Philadelphia.
Davies, Geo. C., C. R. Baird & Co., Philadelphia.
Drinkhouse, Harry, Thos. Devlin & Co., American and Lehigh avenue, Philadelphia.
Drummond, E. M., Drummond Manufacturing Co., Louisville, Ky.
Dimmick, J. K., Anniston Pipe & Foundry Co., Anniston, Ala.
Danleady, Geo., Ingersoll, Sergeant Drill Co., New York City.
Donoghue, M. O., Valentine Iron Co., Bellefonte, Pa.
Durant, E. E., G. F. Warner Manufacturing Co., New Haven, Conn.

E.

Evans, Howard, J. W. Paxson & Co., Philadelphia.
Ellicott, C. N., C. N. Ellicott & Co., Philadelphia.
Edwards, E., General Electric Co., Lynn, Mass.
Ellicott, Geo. N., Southwark Foundry and Machinery Co., Fifth and Washington avenue, Philadelphia.
Echternach, W. H., Foundry of Girard College, Philadelphia, Pa.
Emerick, Geo. S., Geo. S. Emerick Co., White Haven, Pa.
Eagan, Daniel, American Steel Casting Co., Thurlow, Pa.

F.

Flagg, Stanley G., Jr., Stanley G. Flagg & Co., Nineteenth and Pennsylvania avenue, Philadelphia.
Ferguson, Wm., Gates Iron Works, Chicago, Ill.
Frank, Isaac W., Frank, Kneeland Mch. Co., Pittsburg, Pa.
Flagg, Geo., Stanley G. Flagg & Co., Philadelphia.
Fetz, John, Hanover Foundry & Mch. Co., Hanover, Pa.
Farrell, Edward P., Baltimore, Md.
Findley, A. I., The Iron Trade Review, Cleveland, O.
Floyd, H. E., James R. & Sons, New York.
Fulton, Wm. E., Waterbury Farrell Fdy. and Mch. Co., Waterbury, Conn.
Freed, Y. C., Royersford Mch. Co., Royersford, Pa.
Friend, J. W., Clinton Iron and Steel Co., Pittsburg, Pa.
Ferguson, J. H., Brownell & Co., Philadelphia.
Friend, J. T., Clinton Iron and Steel Co., Pittsburg, Pa.
French, Geo. W., J. J. Mohr, Philadelphia.

G.

Goodrich, F. A., F. A. Goodrich & Co., Detroit, Mich.
Gibby, Geo. H., Condor Iron Fdy. Co., Boston, Mass.
Groves, Samuel, Taylor, Wilson & Co., Pittsburg, Pa.
Gibby, F. W., Mechanics' Foundry Co., Boston, Mass.
Gross, F. Max, Evening Star, Philadelphia.
Garrett, Hy. M., Westinghouse Mch. Co., Pittsburg, Pa.
Gill, J. H., Raleigh, N. C.
Glover, Jno. H., Glover Bros., Frankford, Philadelphia.
Goodwin, Geo. S., The "Item," Philadelphia.
Gisriel, Wm., Maryland Brass and Metal Works, Baltimore, Md.
Glover, Thomas, Glover Bros., Philadelphia.
Given, Samuel F., Bement, Miles & Co., Twenty-first and Callowhill streets, Philadelphia.
Greider, Ralph J., Paul S. Reeves & Son, Broad and Catherine streets, Philadelphia.
Graham, Geo. H., Oriskany Mal. Iron Co., Oriskany, N. Y.
Green, W. H., Jr., Vulcan Iron Works, Chester, Pa.
Gadd, H. W., J. Wesley Pullman, Philadelphia.
Gilliams, Jno. F., U. S. Smelting Co., Philadelphia.

H.

Howe, Arthur W., 430 Bourse bldg., Philadelphia, Pa.
Hobson, Thos., "The Iron Age," Philadelphia, Pa.
Harrison, Jno. W., Shickels, Harrison & Howard, St. Louis, Mo.
Howe, F. P., Wm. Wharton Jr., & Co., Twenty-fifth and Washington avenue, Philadelphia.
Holman, Thos. R., Holyoke Mch. Co., Worcester, Mass.
Hill, John, S. Obermayer Co., Cincinnati, O.

Harkins, T. B., T. B. Harkins Foundry Co., Bristol, Pa

Hanes, John, Woodstown, N. J.

Hodge, James M., Crane Iron Works, Catasauqua, Pa.

Hirsh, H. B., Midvale Foundry Co., Allentown, Pa.

Hayssen, Herman, Kohler, Hayssen & Stehn Mfg. Co., Sheboygan, Wis.

Henderson, Wm. C., Thos. Devlin & Co., Philadelphia.

Harris, Wm. A., Baush & Harris Mch. Tool Co., Springfield, Mass.

Hartpence, S. C., Columbia Fdy. Co., Philadelphia.

Hunsicker, H., Mt. Penn Stove Works, Reading, Pa.

Hunt, W. H., Wm. Adams & Co., Philadelphia.

Hetherington, Geo., 222 Greenwich street, Philadelphia, Pa.

Hiesland, Benj. F., Marietta Casting Co., Marietta, Pa.

Hanson, Wm., Pennsylvania Iron Works Co., Fiftieth and Merion avenue, Philadelphia.

Hubley, Jno. C., Hubley Mfg. Co., Lancaster, Pa.

Haeseler, C. H., Pedrick & Ayer Co., Tenth and Hamilton streets, Philadelphia.

Henry, T. M., North & Judd Mfg. Co., New Britain, Conn.

Hammer, Alfred E., Malleable Iron Fittings Co., Branford, Conn.

Hammer, V. L., Malleable Iron Fittings Co., Branford, Conn.

Hibbs, Jos. S., J. W. Paxson & Co., Philadelphia.

J.

Jones, Amos, Jones & Scullin, Philadelphia.

Jones, Frank R., Jerome, Keeley & Co., Philadelphia.

James, Chas., Hy. Disston & Sons, Tacony, Philadelphia.

Jarecki, Alex., Jarecki Mfg. Co., Erie, Pa.

Jones, Jesse, Wm. Cramp & Sons, Philadelphia.

Jobb, Chas. L., Londonderry Iron Co., Ltd., Londonderry, N. S.

Johnson, Geo. T., Thomas Iron Co., Hokendauqua, Pa.

Jones, Thos., The Capitol Mch. Tool Co., Auburn, N. Y.

Janner, Jos. A., Jr., Janner & Steinmetz, Philadelphia.

Julian, J. Hy., Gray's Ferry Foundry and Brass Works, Philadelphia.

K.

Kavanagh, Thos., Kavanagh & McDermott, Fifteenth and Lehigh avenue, Philadelphia.

Knoppel, Jno. C., Buffalo Forge Co., Buffalo, N. Y.

Koons, A. F., Webster, Camp & Co., Akron, O.

Koons, Jos., L. V. R. R. Co., Weatherly, Pa.

Keep, W. J., Michigan Stove Co., Detroit, Mich.

Kelly, T. J., Moore, Kelley & Co., Philadelphia.

Kohler, J. M., Kohler, Hayssen & Stehn, Sheboygan, Wis.

Koken, Wm. T., Koken Iron Works, St. Louis, Mo.

Kirk, Dr. Edw., 535 N. Tenth street, Philadelphia, Pa.

Kuken, F. C., Geo. R. Allen, Thirteenth and Buttonwood streets, Philadelphia.

Kelly, R. B., T. B. Harkins Foundry Co., Bristol, Pa.

Kimball, W. G., S. G. Kimball's Sons, Newburgh, N. Y.

Kirchoff, C., "The Iron Age," New York City, N. Y.

Kelly, Jos. A., Scaife Fdy. and Mch. Co., Pittsburg, Pa.

Kelly, T. P., T. P. Kelley & Co., New York City, N. Y.

Keating, G. B., G. B. Keating & Co., Philadelphia, Pa.

L.

Lindsey, Peter, Manayunk, Philadelphia.

Lindsey, Peter, Jr., Manayunk, Philadelphia.

Lambert, K. J., Syracuse Chilled Plow Co., Syracuse, N. Y.

Logan, Jno. A., Jones & Laughlin, Ltd., Pittsburg,Pa.

Lincoln, Geo. H., G. H. Lincoln & Co., Boston, Mass.

Lanigan, James T., Davis Foundry Co., Lawrence, Mass.

Lacy, James J., Jas. J. Lacy & Co., Baltimore, Md.

Loomis, Jacob, Elwood Iron Works, Elwood, Ind.

Lockhart, W. C., Scott Foundry, Reading, Pa.

Lane, H. M., Lane & Bodley Co., Cincinnati, O.
Laughlan, W. M., Pickands, Mather & Co., Cleveland, O.
Leonard, F. P., Dighton Furnace Co., Taunton, Mass.
Longstreet, J. H., Riverview Iron Works, Bordentown, N. J.
Lobdell, Wm. W., Lobdell Car Wheel Works, Wilmington, Del.
Lewis, T. S., Waterbury Farrell Foundry and Mch. Co., Waterbury, Conn.
Lane, E. J., Wood, R. D. & Co., 400 Chestnut street, Philadelphia.

M.

Matlack, Geo. C., I. P. Morris Co., 1021 Richmond street, Philadelphia.
Matlack, D. J., I. P. Morris Co., 1021 Richmond street, Philadelphia.
McCormick, J. S., J. S. McCormick & Co., Pittsburg, Pa.
McLean, E., Pennsylvania R. R., Altoona, Pa.
May De Courcy, Dickson Mfg. Co., Scranton, Pa.
Moore, W. J. W., Crane Iron Works, Philadelphia.
Mesta, Geo., Leechburg Fdy. and Mch. Co., Pittsburg, Pa.
Magee, Frank A., Magee Furnace Co., Boston, Mass.
Mott, C. M., Abram Cox Stove Co., Lansdale, Pa.
Mosher, W. S., Mosher Fdy. and Mfg. Co., Dallas, Tex.
Messick, Geo. L., Pusey & Jones Co., Wilmington, Del.
Messick, Geo. A., Pusey & Jones Co., Wilmington, Del.
Mager, N., Jr., A. & P. Roberts & Co., Pencoyd, Pa.
McDermott, T. E., Kavanagh & McDermott, Philadelphia.
Michender, Geo. R., Philadelphia.
M'Grath, Louis J., Thos. Devlin & Co., American and Lehigh avenue, Philadelphia.
Mosedale, F. C., Richards, Mather & Co., New Haven, Conn.
Moore, A. B., Sam'l L. Moore & Sons Co., Elizabeth, N. J.
Morris, Hy. G., Philadelphia, Pa.
Mills, Jno. F., Abendroth Bros., Port Chester, N. Y.
Mott, Abram C., Abram Cox Stove Co., Philadelphia.
Miller, O., Westinghouse Air Brake Co., Pittsburg, Pa.
Mann, Ernest E., American Radiator Co. Detroit, Mich.
Murless H. B., Rockville, Conn.
McCartney, H. J., American Telephone and Telegraph Co., New York.
Mohr, G. K., J. J. Mohr, Philadelphia.
Marshall, Alfred, Marshall Bros. & Co., Philadelphia.
Mumford, E. M., Elizabeth, N. J.
Moore, F. F., Monitor Iron Works, New York.
Morton, T. L., R. D. Wood & Co., Philadelphia.
Morris, F. M., Jeanesville Iron Works, Jeanesville, Pa.

N.

Neave, Jno. W., Pusey & Jones Co., Wilmington, Del.
Newkirk, I. Roberts, Wm. Wharton, Jr., & Co., Philadelphia.
Nichols, W. H., P. R. R., Renova, Pa.

O.

Osgood, Edw. P., Osgood & Hart, Charlestown, Mass.
Osborn, Wm., Du Bois Iron Works, Du Bois, Pa.
Outerbridge, A. E., Wm. Sellers & Co., Ins., Philadelphia.
Ormrod, Geo., Donaldson Iron Co., Emaus, Pa.
Ormrod, Jno. D., Donaldson Iron Co., Emaus, Pa.

P.

Paxson, Jno. W., J. W. Paxson & Co., Philadelphia.
Prince, C. L., Camden Iron Works, Camden, N. J.
Pepper, J. Hy., "The Iron Age," 19 S. Fourth street, Philadelphia.
Pfahler, W. H., Abram Cox Stove Co., Philadelphia.
Penton, Jno. A., "The Foundry," Detroit, Mich.
Payne, J. M., Rogers, Brown & Warner, Bullitt Bldg., Philadelphia.
Peckitt, Leonard, Crane Iron Works, Catasauqua, Pa.
Perault, M. J., Fitchburg, Mass.
Pickles, Hy. C., Wilmington Pipe and Foundry Co., Wilmington, Del.

Peterson, J. M., Valk & Murdoch, Charleston, S. C.
Pierce, E. B., Wheeler Foundry Co., Worcester, Mass.
Pele, Thos., Bement, Miles & Co., Philadelphia.
Pettinos, Geo. F., Pettinos Bros., Bethlehem, Pa.
Pettinos, C. E., Pettinos Bros., Bethlehem, Pa.
Patch, H. O., American Glutrose Works, Ninth and Chestnut streets, Philadelphia.
Pearse, W. C., American Glutrose Works. Ninth and Chestnut streets, Philadelphia.
Peacock, Wm., Union Lock and Hardware Co., Lancaster, Pa.
Potts, Henry, Pottstown, Pa.
Picard, A. J., Clinton Iron and Steel Co., Pittsburg, Pa.
Pedrick, H. A., Pedrick & Ayer Co., Philadelphia.

R.

Rhoads, W. S., W. S. Rhoads & Co., Twenty-third and Wood streets, Philadelphia.
Rominger, Geo. G., Girard Iron Works, Twenty-third and Master streets, Philadelphia.
Rohland, John, Coxe Iron Mfg. Co., Drifton, Pa.
Ranklin, Thos. I., Abram Cox Stove Co., Philadelphia.
Ribert, J. M., Hubley Mfg. Co., Lancaster, Pa.
Reed, Jno. O., Standard Mfg. Co., Pittsburg, Pa.
Rorke, Jos. B., P. & R. Iron Foundry, Reading, Pa.
Robinson, Edw., Wells Light Mfg. Co., New York.
Rebmann, Godfrey, G. Rebmann & Co., Philadelphia.
Riehle, Fred. A., Riehle Bros., Ninth and Master streets, Philadelphia.
Rebmann, Harry G., G. Rebmann & Co., Philadelphia.
Ruhland, H., Girard Iron Works, Philadelphia.
Richards, Jos., Delaware Metal Refinery, Philadelphia.
Rea, H. R., Robinson & Rea Mfg. Co., Pittsburg, Pa.
Robinson, W. C., Robinson & Rea Mfg. Co., Pittsburg, Pa.
Russel, Jno. R., Russel Wheel and Foundry Co., Detroit, Mich.
Rood, V. H., Jeanesville Iron Works, Jeanesville, Pa.
Rebmann, G. R., Morse, Williams & Co. Philadelphia.
Rainey, W. T., Harrison Bldg., Philadelphia.
Rex, A. C., A. C. Rex & Co., Frankford Philadelphia.

S.

Search, Theo. C., Philadelphia.
Schumann, Francis, Tacony Iron and Metal Co., Tacony, Philadelphia.
Sheppard, Howard R., Isaac A. Sheppard & Co., Philadelphia.
Sauter, Wm. F., G. Rebmann & Co., Philadelphia.
Stevens, W. W., W. W. & R. S. Stevens, Ninth and Montgomery avenue, Philadelphia.
Stone, H. H., Pennsylvania R. R. Co., Altoona, Pa.
Sorge, A., Jr., 1533 Marquette Bldg., Chicago, Ill.
Stein, Wm. H., Ticonderoga Mch. Co., Ticonderoga, N. Y.
Sutherland, A. G., K. C. Wire and Iron Works, Kansas City, Mo.
Smyser, Geo. P., E. G. Smyser's Sons, York, Pa.
Smith, Jno. Jr., S. H. Hodge & Co., Detroit, Mich.
Shields, Curtis W., Ingersoll-Sergeant Drill Co., Easton, Pa.
Sadtler, J. P. B., Baltimore Link Sash Weight and Fdy. Co., Baltimore, Md.
Shaw, Bartlett M., Walker, Pratt Mfg. Co., Boston, Mass.
Steward, James L., Armstrong Iron Works, Vineland, N. J.
Sleeth, S. D., Westinghouse Air Brake Co., Pittsburg, Pa.
Seaman, J. S., Seaman, Sleet & Black, Pittsburg, Pa.
Sawyer, J. C., Somersworth Mch. Co., Dover, N. H.
Speara, John, Columbia Grey Iron Co., Columbia, Pa.
Stibgen, Geo. F., Marietta Casting Co., Marietta, Pa.
Stirling, Jas. S., Harlan & Hollingsworth Co., Wilmington, Del.
Saunier, E. C., Clinton Iron & Steel Co., New York.
Smith, Pemberton, N. Y. Car Wheel Works, Buffalo, N. Y.

Shaffer, F. B., Union Foundry Co., Elizabeth, N. J.
Scoville, E. U., Manlius, N. Y.
Scoville, Geo. B., Waterbury, Conn.
Summer, Edw. A., American Radiator Co., Detroit, Mich.
Schumann, Frank, Tacony Iron and Metal Co., Tacony, Philadelphia.
Sherrard, J. M., Taylor Iron and Steel Co., High Bridge, N. J.
Smith, W. H., Whitehead Bros. Co., New York.
Stauffer, Howard, Columbia Grey Iron Co., Columbia, Pa.
Steinmetz, J. A., Janney & Steinmetz, Drexel Bldg., Philadelphia.
Smyser, Jas. A., E. G. Smyser's Sons, Baltimore, Md.
Smith, G. Ross., Medeira, Hill & Co., Philadelphia.
Shoen, Chas. P., Shoen Mfg. Co., Pittsburg, Pa.
Smearman, M. F., Pennsylvania R. R. Co., Altoona, Pa.

T.

Thompson, Josiah, J. Thompson & Co., Philadelphia.
Taylor, Rob't, Taylor, Wilson & Co., Pittsburg, Pa.
Talbot, Benj., Pencoyd, Pa.
Treat, C. A., C. A. Treat Mfg. Co., Hannibal, Mo.
Tittle, C. L., Blairsville, Pa.
Townsend, D., Philadelphia Roll and Mch. Works, Philadelphia.
Taylor, R. J., R. J. Taylor & Son, Philadelphia.
Taylor, H. B., Pettinos Bros., Philadelphia.
Tolmie, Robt. C., Lobdell Car Wheel Co., Wilmington, Del.
Tyler, Walter B., Southern Fdy. and Mch. Works, Fredericksburg, Va.
Taylor, Clarence, Philadelphia.

V.

Valentine, H. R., M. D. Valentine & Bro. Co., Woodbridge, N. J.
Van Tine, G. W., Singer Mfg. Co., Elizabeth, N. J.
Voight, Chas. F., Sterling Metal Ref. Co., Philadelphia.

W.

Wood, Walter, R. D. Wood & Co., Philadelphia.
Wilbraham, Jno. S., Wilbraham Baker Blower Co., Philadelphia.
Warner, Jno. M., Rogers, Brown & Warner, Philadelphia.
Whitney, Asa W., A. Whitney & Sons, Philadelphia.
Winchester, I. W., Magee Furnace Co., Chelsea, Mass.
Wathey, Thomas, United Verde Copper Co, Jerome, Arizona.
West, Thos. D., Sharpsville, Pa.
Wiard, Geo., Wiard Plow Co., Batavia, N. Y.
Wittingham, A. J., Moore, Kelly & Co., Philadelphia.
Winlock, J. P., Barbour, Stockwell & Co., Cambridge, Mass.
Walker, Arthur W., Walker & Pratt Mfg. Co., Boston, Mass.
Weyhenmeyer, Jerome, Jeanesville Iron Works, Jeanesville, Pa.
Weaver, E. E., Midvale Foundry Co., Allentown, Pa.
Wheeler, Andrew, Morris, Wheeler & Co., Philadelphia.
Whitehead, V. L., Whitehead Bros. Co., Buffalo, N. Y.
Whiting, C. W., Van Bergen & Co., Ltd., Carbondale, Pa.
Webster, Wm. R., Philadelphia.
Whittemore, Harris, Naugatuck Mal. Iron Co., Naugatuck, Conn.
Walder, Amos, Genesee Foundry, Rochester, N. Y.
Walker, Geo. R., J. Thompson & Co., Philadelphia.
Wortham, R. M., Keystone Brass Foundry, Philadelphia.
Williams, Thos. H., A. A. Griffing Iron Works, Jersey City, N. J.
Walker, W. W., Pusey & Jones Co., Wilmington, Del.
Wood, C. R., R. D. Wood & Co., Philadelphia.
Wilson, A. D., Gray's Ferry Fdy. and Brass Works, Philadelphia.

Y.

Yagle, Wm., Wm. Yagle & Co., Ltd., Pittsburg, Pa.
Young, M. B., Philadelphia.

The First Day.

The delegates began early to fill the reception room and parlors of the Manufacturers' Club, where after registering they spread over the city in small parties to visit the various objects of interest.

Called to Order.

At 2 p. m. the hall of the club was very comfortably filled, when Francis Schumann, president of the Philadelphia Foundrymen's Association, called the gathering to order, and proceeded to welcome those present in the following words:

Mr. Schumann's Address.

"To me falls the honor, on behalf of the foundrymen of Philadelphia, of greeting you and bidding you welcome. We will endeavor to make your visit one both of pleasure and usefulness.

"We have undertaken to bring together here those interested in the welfare of an industry consisting of nearly 4,000 separate establishments, with an aggregate capital invested of about $115,000,000, employing about 120,000 persons, whose annual wages amount to nearly $63,000,000. Some 2,600,000 tons of castings are produced annually, requiring some 430,000 tons of coal and coke. The total annual disbursements for material and labor amount to $114,000,000.

"This is the first time in the history of our country that those engaged in so great an industry have ever met to confer upon questions relating to their mutual welfare.

"The excessive, and to a certain extent artificial, competition now existing in all industries of this country has brought about a general movement tending toward combinations, for the purpose of combating and controlling this unrestrained and dangerous rivalry.

"Prices have taken a downward course, far below that which healthy competition would warrant; it has not only resulted in greatly deteriorating the character of the product and undermining that finer sense of honor of the individuals engaged, but is also testing to its utmost the endurance of strong establishments whose very existence is at stake, no matter how well prepared they may have been at the beginning of the struggle. We are living in an era of conflict; on the one hand, organized and concentrated capital; on the other, that which is scattered and disunited. Weak or partial organization will not avail. Unless all engaged in an industry will unite and adopt vigorous measures that may be rigidly enforced for controlling the individual members, the result will be failure.

"Our establishments are the results of our life's labor; we intended and hoped that they should endure beyond our time. To maintain these intentions and hopes has brought about this convention of foundrymen from all parts of this great country.

"You are here to deliberate upon questions of great importance to all, primarily that of organization. Let us be wise and above all personal matters that conflict with the aims and objects of this convention, the prosperity of the foundry industry."

Mayor Warwick Welcomes the Delegates.

At the conclusion of President Schumann's address he introduced Mayor Warwick, of Philadelphia, who made an exceedingly happy and humorous address.

While he never deviated from his subject, he managed to say many things that put his listeners into the best possible humor, and it will be long remembered as a specimen of what Philadelphia's mayor could do in the way of oratory of the most finished kind.

Space forbids the introduction of his remarks in full here, but among other things he said:

"We have prepared a warm reception for you. (The thermometer stood at 90°.) I am here to give you a warmer one, because our hearts, as well as the sun, have united to make it as pleasant for you as possible.

"Philadelphia is becoming a city of conventions, and it is a good thing for the city that it is so. There was a time when conventions were not often held, because, through the want of facilities of travel, it was difficult for people to come together, but in this age of progress, in this age of steam and electricity, with both of which your industry is so closely connected, we think nothing of going from one end of the Republic to the other, and thus do these useful gatherings become more easy to arrange.

"And this city which you have honored with your meeting has much to be proud of. It has made more progress in the last ten years, so the statistics show, than any similar city in the country. And it is a suitable place for you to meet to make your constitution, for it was here that the constitution of this country was cast; it was here that the founders of our nation met. They were

great foundry men, those ancestors of ours. That constitution came out of friction and out of fire, and the men that wrought produced a grander work than they themselves had any idea of. The nation now extends from ocean to ocean, and from the lakes to the gulf, and this great and varied people is closely united and rendered harmonious by the application of the great industries of steam and electricity."

Pres. T. C. Search of the National Association of Manufacturers delivers an Excellent Address.

At the conclusion of Mayor Warwick's address, which was warmly applauded, Mr. Theodore C. Search, president of the National Association of Manufacturers, was introduced and delivered an address, which every foundryman and every ambitious, loyal and intelligent citizen should read carefully, as it possesses much food for thought, that it must have taken a long time to prepare. Mr. Search said:

"The great past has accumulated a vast storehouse of facts, and it is incumbent upon the present to generalize these accumulations and construct laws that shall harmonize and unify and make subservient to our uses all these treasures. The more we can pass these details in review before us the more complete will be our mastery over the science that underlies our work and controls with startling power our further advances into the region of investigation and accomplishment.

"Each new year brings its contribution before us and demands our best and highest consideration. No matter how thoroughly you may dispose of the pressing questions of the day, the human mind is so constituted that every scientific problem we may solve is but a key to unlock the door of still deeper mysteries which shall test the keenest training of mind and body. It is the solution of these ever-recurring problems that makes for progress, that sets a still higher niche in the wall, that submerges the high-water mark of yesterday, that notifies us that to-morrow will introduce problems which only those who meet and solve those of to-day can hope to successfully encounter.

"In considering the necessity for keeping abreast of the times, it is with no little satisfaction that we to-day witness this meeting of the foundrymen of the United States in the city which, since the days of Rittenhouse and Franklin, has been the home of a deep and abiding faith that scientific thought of the very highest quality belongs by right to all industries, and that it is the wisest use of our energies to bring them to bear on the practical and possible elements of investigation.

"Perhaps the most important thought I can present to you is my abiding faith in our own country and the relative value of its working energy. Mulhall, in his recently published tables, gives some statistics of the productive energy of various countries, and he shows that aggregate of all the energies in use in the United States in 1820 was equal to 446 foot tons per capita. In 1890, this had increased to 1,940 foot tons, and the position of the other countries was as follows:

	Foot Tons.
England	1,470
Germany	902
France	910
Spain	590
Austria	560
Italy	380

To present this comparison in a form more readily comprehended, let me reduce it to percentages, taking the productive capacity of the United States as 100. Then we will have:

England	79
Germany	46½
France	47
Spain	30
Austria	29
Italy	20

"From this, it will be seen that we produce per capita 1 3-7 times as much as England, 2 1-10 times as much as Germany or France, 3 1-3 times as much as Spain or Austria, and 5 times as much as Italy. These figures have a deeper significance than a superficial glance would show, as they indicate that our own country is a productive factor that cannot be much longer confined to its own limits for trade, that the higher wage of our labor is being rapidly discounted by the effectiveness of our methods, and that the markets of the world are not so far from our grasp as the workingman may imagine.

"We are rapidly demonstrating that it is possible to overcome the higher wage earnings of our labor by a greater product, and that it pays to maintain the splendid effi-

ciency of our workmen for the sake of its greater value. That it has been possible to maintain the wages of our labor in the face of continually declining prices of nearly all products, has been due to the constantly increasing productive capacity of our workmen and our machinery. The substitution of science for the "rule of thumb" has also contributed to the same results. In your own industry improved cupola construction has lessened the consumption of fuel in melting iron, molding machines have largely increased the output per man on certain lines of work, while improved appliances for handling material, molds and castings have materially lessened the cost of labor by increasing the efficiency of each unit.

"In the manufacture of iron and steel there has been a wonderful increase in the productive capacity of labor through better methous and more efficient machinery. The production of pig iron in the census year 1870 averaged about 53 gross tons for each man employed in the industry; in 1880 it was about 81 tons, and 1890 it was about 321 tons. In 1876 the average annual capacity of each blast furnace was only 6,611 gross tons, while at present the average is 37,065 gross tons, so that while the total number of blast furnaces has decreased from 713 in 1876 to 469 at present, their aggregate annual productive capacity has increased during the same time from 4,874,312 gross tons to 17,373,637 tons. In the last four years the number of Bessemer converters has increased only from 95 to 99, yet the productive capacity has grown from 5,857,143 gross tons in 1892 to 9,472,350 tons at the beginning of this year.

"In 1884 the average daily output of coal for each man employed in the bituminous mines of Pennsylvania was 2.18 tons, while in 1894 it was 3.22 tons, and during the same ten years the output of anthracite increased from 1.70 tons per man per day to 2.07 tons.

"The evolution of our textile industries has been marked by a marvelous increase in the productive capacity of labor, of which I have time to give but few illustrations. The introduction of the Brussels power loom in 1848 by Erastus B. Bigelow increased at a single stride the productive capacity of a single weaver from three or four yards of carpet daily to 20 or 25 yards. Forty years ago our woolen manufacturers used a broad loom which ran at about 40 picks per minute; now they run up to 100 picks and more.

"In the manufacture of cotton goods there have been wonderful improvements in all the processes of carding, spinning and weaving. In 1870 the best type of frame spindle which was available to our cotton manufacturers was capable of 5,500 revolutions per minute, while in 1890 the possible speed had increased to 10,000 revolutions, and since that time there have been still further developments in this line. From the hand loom to the power loom was a great step in itself, but instead of the machine which formerly required the undivided attention of an operative, we now have looms which are so largely automatic in their operations that a single weaver can tend eight of them.

"I might go on thus from industry to industry, showing how invention has supplemented the manual skill of our laborers and enormously increased their productive power, but what I have said will suffice for purposes of illustration and to demonstrate why our labor though highly paid is not dear.

"Let me pass now to another thought which is practically pertinent to this occasion. This is essentially an era of organization and I view the multiplicity of trade and technical associations as an evidence of the recognition of the need for concerted action in striving to attain desired objects. There are distinct fields of usefulness for all these various organizations, and I feel assured that you who have participated in the discussions of the Foundrymen's Association of Philadelphia, the Western Foundrymen's Association or any of the kindred organizations, can furnish ample evidence of the benefit which you have derived from such interchange of thought and exchange of ideas. The man who does not keep closely in touch with his competitors in these days is likely to find himself far behind in the race. No man has a monopoly of the good ideas in any branch of industry and there is no man who is so well informed, so thoroughly conversant with the details of his own business that he can learn nothing by discussion with his fellow manufacturers. Those who know the most, those who are the most progressive in their business, are the most willing to acquire new ideas which will place them still further in the lead.

"The purposes of this convention—to bring the foundrymen of the country together in a national assemblage and to encourage the formation of local organizations—are indicative of the needs of the day, not only in this particular branch of industry but in all lines of business. Local associations with concentrated memberships are able to discuss in frequent meetings such topics as are local in their importance or of technical interest. For a national association, representing the constituencies of all the local organizations, there is also a distinct field of usefulness in the consideration of broader problems which bear upon the industry at large without regard to locality. There need be no conflict between local and national associations for each is useful to the other. Along certain lines a national body can exert more powerful influence than is possible to any local organization, while in other matters a local association can do all that is needful.

"We have national organizations of manufacturers of boilers, glass, wagons, agricultural implements, iron and steel, carriages, furniture, stoves, woolen goods, bicycles, bricks, cigars, confectionery, lumber, paints and varnish, and many other articles. Each of these organizations voices the sentiments and exerts the influence of an important and powerful constituency. As representing the interests of great industries, the importance of these national associations can not be questioned.

"but there are needs which even these organizations do not fully meet. There are problems which have an equal interest for all lines of business and for all branches of manufactures, and their successful solution demands the united action of all the interests which are involved. It was this condition of affairs which gave birth to the National Association of Manufacturers, which aims to unite all manufacturers in their efforts to secure those results which are of equal importance to all of them. It is not the aim of this association to supplant any of the other national or local organizations, nor to interefere with their work in any manner. On the contrary, it is our purpose to supplement their efforts and to extend their influence, and to unite in one powerful movement all the forces now separately and independently exerted. The possibilities of such a concentration of power are tremendous. When the manufacturers of the United States shall lend their united energies to the accomplishment of any desired result, there is no obstacle which can bar their progress. In the belief that every attempt at organization, either local, state or national, is a recognition of this possibility, I view with great pleasure this present gathering of foundrymen from every section of our country, and I wish you all possible success in the work of this convention."

W. H. Pafhler, a Prominent Foundryman, Speaks.

The chairman announced that Mr. Birkinbine, whom it had been expected would address the convention on "The Objects of the Convention," had been unavoidably detained on a return journey from the West and, therefore, W. H. Pafhler, of the Abram Cox Stove Company, would address the meeting on the subject. Mr. Pafhler is one of the most ready speakers engaged in the foundry business in this country, and his remarks were of a practical nature and very fitting for the occasion, and from one well qualified by knowledge and experience to speak, what he said was especially pleasing.

Mr. Pafhler then, after an apology for his lack of proper preparation for an address on so important a subject, addressed the meeting explanatory of the objects for which the convention had been called. He referred to what he considered the responsibility of the Philadelphia founders in calling the representatives of the various foundry interests together, and believed that it would be grave unless the visitors were given, not something to do, but the opportunity to do something, and that was really what the meeting had been called for—to further the interests of every individual by co-operation and organization. Founders from widely separated sections of the country had always some interests in common and were ready to come together when the opportunity was afforded. He instanced the formation of the Foundrymen's Association three or four years ago. A half dozen of the foundrymen of Philadelphia met and talked over the advantages of an association that would bring together all the foundrymen of the city of Philadelphia. The association was started without a purpose and he believed

its great success was due to the fact that it had no especial purpose. He believed that the failure of great trade organizations had been owing mainly to their having started for a specific purpose. Organize and your organization will go on—it could not be stopped. The foundrymen soon found they had interests in common and the membership of the association grew. What was the most surprising thing of all was that right in Philadelphia, men engaged in the same business, men whose names were known all over the city, met at the association's meetings and were introduced to each other for the first time. The association now had a membership of 150, comprising not only the foundrymen from Philadelphia, but from five or six adjoining States. They soon learned of the formation of a kindred organization in Chicago, which had gathered together the nucleus of a large association there. Some time ago it was thought well to bring these two associations together, if not for business, for friendly intercourse, and to allow of trade acquaintances being made. There was no purpose in bringing the present gathering together other than to give all a chance to talk over matters of interest.

The Convention gets down to Business.

At the conclusion of Mr. Pafhler's address, the chair stated that the business of the convention for which they had met together was next in order. The election of a temporary chairman and secretary were the first matters requiring attention.

Temporary Officers Chosen.

Mr. Schumann and Howard Evans were unanimously and without any discussion selected as chairman and secretary respectively. Upon accepting the position, the chair man made a few appropriate remarks, and asked the pleasure of the meeting, whereupon Mr. F. A. Riehle presented the following resolutions:

The Resolutions.

"Whereas, There are now in existence in different portions of America various associations of foundrymen doing their work in restricted territories; and

"Whereas, The work done by these associations has been productive of much benefit to our foundry interests; and

"Whereas, There are many foundrymen not now, and under present conditions not likely to be affiliated with any of these associations; and

"Whereas, It is desirable that the interests of the foundry business be furthered by a closer association among all the foundrymen of America in order that any improvements or valuable information concerning the business, or any portion of it, should become as widely available as possible; therefore, be it

"Resolved, That it is the sense of this convention that there should be formed an American foundrymen's association to further the closer relationship among foundrymen necessary to carry out the objects set forth in the preamble to this resolution; and let it be further

"Resolved, That a committee of five be appointed by the chairman of this meeting to draw up the necessary constitution and by-laws for the proper government of the said American Foundrymen's Association, and to report to this body at the earliest possible moment."

On motion of Mr. Yagle, seconded by Mr. Wood, the resolution was carried without discussion, and the chairman appointed the following committees:

Committees Appointed.

Committee on Constitution—A. Sorge, Jr., Chicago; R. Taylor, Pittsburg; Frank A. Magee, Boston; J. Best, Montreal; C. S. Bell, Hillsboro, Ohio.

Committee on Nominations—Stanley G. Flagg, Jr., Philadelphia; H. M. Lane, Cincinnati; S. Groves, Pittsburg; James A. Beckett, Hoosic Falls, N. Y.; Wm. Ferguson, Chicago.

Tuesday Evening.

The evening session was held in the hall of the Franklin Institute and was given up entirely to the reading of papers. The first one by Mr. A. E. Outerbridge, Jr., of Wm. Sellers & Co., Incorporated. It was elaborately illustrated by the aid of a stereopticon and lantern slides, and as we desire to produce many of the illustrations it will appear in full in our July issue.

Following Mr. Outerbridge came Mr. Curtis W. Shields, of the Ingersoll-Sergeant Drill Company, whose paper, entitled "Compressed Air in the Foundry," was as follows:

Compressed Air in the Foundry.

CURTIS W. SHIELDS.

Compressed air has long been known as an ideal medium for power transmission, but its introduction into the arts has been slow because of the general lack of knowledge of the subject, due in a measure to the limited experience had with it.

It has been looked upon as being an expensive power at best, too much of a mystery and something to be avoided rather than encountered and mastered.

In many cases cheap and badly designed air compressors are put in use, and where such machines have been designed to occupy a small space or to be light in weight compressed air is sure to cost a great deal to produce, and this has stood in the way of the general introduction of compressed air more than anything else.

Only recently inventive genius has been turned toward the development of labor-saving machines which would use compressed air as a motive power.

Since compressed air is now produced economically, owing to the many recent improvements made in the design and construction of compressing machinery, the up-to-date plant without its air compressor in the power-house is the exception. Devices for using air are being placed upon the market in rapid succession, and its field of usefulness has broadened until now it is practically indispensable in a great many operations, and its economic value is recognized.

In the latest and most approved types of compressors the mechanical efficiency has been found under actual working conditions to be as high as 95 per cent, while an efficiency of 85 per cent or better is to be obtained in a small compressor suitable for any moderate foundry duty.

In order to get the best results from the machines using compressed air it is of the greatest importance that the air supply shall be constant and ample.

If the source of power is disabled great loss is at once entailed through the stoppage of the machinery actuated by compressed air. Therefore, the air must always be ready so that the instant it is called upon the proper working pressure will be admitted to the machinery.

To insure this beyond peradventure the compressor must be substantially constructed on the designs shown by the severe test of experience to give the best results.

The durability of an air compressor depends largely upon the design of the air parts. Steam engine construction has reached such perfection that the steam cylinder rarely causes annoyance because of poor design, and seldom meets with any accident that incapacitates the machine.

If a belt-driven compressor is used the whole steam end is eliminated, and the cost of the plant is somewhat reduced.

As the valves are the most essential feature of an air compressor, it is clear that in order to insure the proper and efficient working of the whole machine the valves must work properly and effectively at all times, and under all conditions.

The poppet valve is perhaps the most common type employed in air compressor construction, and is used for both inlet and discharge.

Inlet valves of this class are very apt to cause endless trouble, particularly when they are located in the cylinder heads, as a broken stem or a loose nut permits the valve or part of it to drop into the cylinder. This is not conducive to the welfare of the compressor, and is apt to cause more or less damage.

This danger may be obviated to some extent by placing a guard plate on the inside of the cylinder head. This remedy has the objection that it increases the space lost for clearance and slightly restricts the passage of air into the cylinder.

In the most approved type of compressor, poppet valves are located in the ends of the cylinder instead of in the heads and are so placed that they have a vertical instead of a horizontal lift. This arrangement insures an even wear on the valve and its seat and prevents leakage. It also prevents the piston from coming in contact with the valves, and in case of a break the valve cannot be sucked into the cylinder.

This disposition of the inlet valves leaves the entire cylinder head free to be fitted with a water jacket or cooling space.

It is not practicable to make poppet valves of any great diameter, hence when a large machine is built it is necessary to use a number of valves. This divides the air entering the cylinder into several small

streams which pass over heated surfaces, thereby increasing the friction of the air entering the cylinder, and decreasing the capacity of the compressor.

By removing the inlet valves from the cylinder head a large cooling surface, equal to about three-fourths of its area is at once made available. This is more valuable for cooling than the cylinder jacket alone, because the air is hottest after the piston passes the center of the cylinder; hence, we have the hot air pressed against the cold cylinder head where it rapidly gives up its heat.

Many of the difficulties and disadvantages have been successfully overcome by the piston inlet valve. This device comprises a hollow tail rod passing through a stuffing box in the back cylinder head; a hollow piston into which the air is admitted through the tail rod, and a ring valve of T section on each side of the hollow air piston head.

These valves allow the air to pass alternately into each end of the cylinder, and are actuated by means of their own inertia, opening or closing at the moment compression ceases or begins.

These piston valves are exceedingly durable, as they are forged from a solid billet of dead soft open hearth steel, and are made without a weld. Severe tests of long duration have proved them to be practically indestructible. Five years of constant duty night and day, scarcely making them show any appreciable wear.

By means of the piston inlet device a concentrated air inlet current is secured.

A suitable sleeve or conduit pipe may be made to conduct to the tail rod inlet air drawn from that source outside of the engine room most favorable to coolness, dryness and freedom from dust or other foreign matter.

Cold air when admitted to the cylinder results in a larger volume of compressed air for a given diameter and stroke of cylinder. It is plain, therefore, that too much stress cannot be laid on the importance of a cold dry inlet, and an efficient method of water jacketing, particularly in the cylinder heads.

Where the load on the compressor varies much it is important that an efficient regulator or governor should be provided, which is thoroughly automatic in its action, and requiring no attendance.

Under the ordinary conditions existing in foundries a belt-driven compressor is usually more favorably considered than one driven by steam.

The ordinary shop engine of a good type gives better results for the amount of steam used than if the steam was used to drive a small compressor direct.

A belt compressor fitted with a proper regulator absorbs only enough power to meet the demands of the work performed, and being run in connection with other machinery its effect on the coal consumption is not noticeable.

However, in many cases a steam-driven compressor is preferable, because a high-class steam actuated compressor uses steam almost, if not quite as economically, as a shop engine, and whatever loss there may be is more than made up for by the advantages of a steam-driven compressor. With them all shafting and belting are avoided, and the machine can be located in the engine room, where it can be under the care of the engineer. If installed in the foundry the dust and sand have a very appreciable affect upon the bearings and moving parts, and no matter how carefully housed, your compressor cannot be as well taken care of as though it were in the engine room. Frequently, when a foundry has no steam power, the compressor can be located in a neighbor's engine room, and power rented to operate it, as the air pipe can be run any desired distance quite readily and at small expense.

Transmission of power by compressed air has the advantages of certainty and regularity in action; simplicity in machinery, freedom from the possibility of fatal accidents, and the assistance given to ventilation and in cooling the shop. These last being considerations of much importance in many cases. Works employing this method do not require the supervision of a specially qualified expert, and the chances of interruption by accident through negligence are certainly less than in any other form of power transmission.

When we come to the question of laying out the piping for a foundry it is well to keep this simple rule in mind. The head necessary to drive the air through the pipe is as the square of the velocity, and to obtain the best results the flow of air through the pipe should not exceed 20 feet per sec-

ond. If this is borne in mind air can be conveyed almost any distance with little or no loss.

In the case of the famous Jeddo tunnel at Hazleton, Pa., air at 60 lbs. pressure was conveyed a distance of 10,680 feet through 5¼-inch pipe, and the gauges showed exactly the same pressure at the end of the pipe as they did at the receiver.

The receiver should be placed in any convenient place and should be of not less capacity than the rating of the compressor in cubic feet of free air per minute.

It is preferable to have the inlet pipe from the compressor enter the receiver near the top and the outlet near the bottom, and at right angles to the inlet. A drain cock at the lowest point should be provided and a pressure gauge safety valve on the top is a great convenience.

Too frequently no attention is given to leaks in the air pipes as the air is not visible and causes no discomfort in its escape. Leaks, however small, should receive prompt attention if anything like economical results are desired.

Leaks in air pipes are fortunately easy to find, because of the hissing noise caused by the escaping air. This point is an important one in comparing pneumatic with electric transmission of power.

Leaks in electric wires are hard to discover, and are usually found after some damage has been done. The current may be led away through the crossing of other wires, moisture, or frame of building, if of iron, and occasion an unseen, though none the less undesirable, loss.

A little thought and attention given to the elimination of turns and angles in the pipe mains will amply repay for the trouble. It is a great economy to lead the air mains centrally and then run smaller connections to points adjacent and convenient to place air is to be used.

If this is done short lengths of hose pipe can be attached wherever most convenient for connection to hoists, sand sifter, or other apparatus, or the air can be used for the same purposes that the bellows and brush are employed.

The application of the air hoist to cranes may be made in an almost endless variety of ways to meet the requirements of foundries. The most common types are simple cylinder hoists either vertical or horizontal, or in combination with a low pressure hydraulic system. In many instances direct acting hoists may be readily applied to hand power cranes already in use without in the least interfering with the gearing, and at a very small expense.

In an air hoist the power and load are brought together in the most simple manner. A boy with this aid can lift a given load a dozen times while a gang of several men are operating a chain block or windlass.

There is no noise, no jar, and the load is always balanced. In foundries where an overhead traveler cannot be installed air hoists suspended from trolleys running on an overhead track answer very satisfactorily, and if hose couplings similar to those used in connection with the ordinary air brake are provided, by simply detaching the hose connection after load is raised the hoist may be run on the overhead track to any desired part of the establishment.

This is especially valuable in conveying flasks outside of foundry to storage sheds, patterns to pattern shop, or finished castings to machine shop.

Nearly every foundryman is conversant with the value of air hoists in the foundry for lifting flasks and copes, drawing patterns and conveying cores to ovens.

Few of us realize how cheap an air hoist is to operate apart from its convenience and speed in handling loads. It has been estimated by Mr. Frank Richards that at 100 lbs gauge pressure compressed air costs 5 cents per 1,000 cubic feet of free air.

In a very interesting article recently published this gentleman figures the cost of operating a hoist as follows: "Suppose we have a hoisting cylinder 6 inches in diameter with a piston rod or hoisting rod 1 inch in diameter, and capable of lifting 4 ft. or more. Then, using air in the cylinder at an effective pressure of 90 lbs, the lift of the hoist will be $(6^2\text{-}1^2)\times.7854\times90$—2,475 lbs.

"If this weight is lifted say 4 feet the volume of air used will be: $(6^2\text{-}1^2)\times.7854\times 4\text{-}144$—.7636 cu. ft. To this we add 30 per cent to cover all possible contingencies: .7636×.229=.9926, and we will call this 1 cu. ft. The one loss that seems to be inevitable, and which is included in our 30% allowance, is in taking up the slack of the hoisting chain, or other means of attaching

to the load, before the hoisting actually commences, so that a certain portion of the cylinder must be filled with the compressed air, besides the actual 4 feet of travel for the lift. As the air in the cylinder is up to a pressure of 90 lbs or 7 atmospheres, the volume of free air used will be seven cubic feet and the cost of this will therefore be 7-1,000, or .007×.05—$0.00035, and this is all we have to pay for lifting more than a ton a height of 4 feet. A hundred of such hoists will be made, of course, for $0.035 or 3 1-2 cents. The accompanying table, which might be greatly extended and still not cover all the actual conditions of service, will be found of interest, especially in the idea that it conveys of the cost of air hoisting. It is probable that many persons will be surprised at the low figure.

"In connection with the low cost of air, it is to be remembered that the hoists are also simple and cheap."

Air Hoist Table.

A table of the lifting capacities of direct acting air hoists, with volume of free air per lift, and cost of air per single lift and 100 lifts, with a maximum lift of 4 feet, and a minimum pressure of 90 lbs air furnished at 5 cents per 1,000 cubic feet of free air:

Diameter of cylinder.....	Effective area of piston.....	Maximum weight lifted.....	Cu. ft. free air for 4 ft. of lift	Cost of air per lift.....	Cost of air per 100 lifts.....
2	3.05	274	.74	$0.000037	$0.0037
3	6.87	618	1.67	.000084	.0084
4	12.22	1,099	2.97	.000149	.0149
5	19.09	1,718	4.64	.000232	.0232
6	27.49	2,474	6.68	.000334	.0334
7	37.42	3,367	9.09	.000455	.0455
8	48.87	4,398	11.88	.000594	.0594
9	61.85	5,566	15.03	.000752	.0752
10	76.36	6,872	18.56	.000928	.0928
11	92.39	8,315	22.46	.001123	.1123
12	109.96	9,896	26.73	.001337	.1337

Air used in combination with a low pressure hydraulic system gives the best results for heavy loads. By interposing the water between the elastic medium air and the load we eliminate that element of danger which otherwise would be present in handling vessels of molten metal, as in foundry practice, and also obtain a sort of elastic positiveness which is so essential and desirable. In the actual work of molding, as in lifting copes and molds, drawing patterns and moving cores, the men are enabled to do about 50 per cent more work and do it easier and better when equipped with a hydro-pneumatic hoist. Included in this percentage is the saving in repairs and the danger of losing castings. These hoists more nearly approach the old-fashioned hemp rope cranes in their elasticity as the compressed air behind the water seems to impart this peculiar quality.

All danger of the liquid freezing is overcome by using a non-congealing compound or a little glycerine, wood alcohol or chloride of magnezium added to the water.

In addition to operating movable hoists air has proven its value for conveying pig iron to the top of the cupola, and for breaking up scrap by lifting a heavy weight which is dropped some 15 or 18 feet. This pig breaker broke three half pigs into three pieces each in one minute, and can easily break 20 tons of pig while a man is breaking up one ton by the old sledge method. A portable pneumatic drilling machine for boring holes to weaken stiff castings is used to advantage in connection with this breaker.

The product of a molding machine can be greatly increased if the handling of the sand in shovels is done away with. This is accomplished by an air jet, which at 60 pounds pressure will lift 100 pounds of sand per minute 20 feet high. A quarter inch nozzle will use 90 cubic feet of free air per minute doing this duty. By elevating the sand to a bin overhead and then conveying it in a chute or pipe directly over the molding machine much time and labor can be saved.

A simple slide in the pipe forms a ready means of regulating the amount of sand served to the machine for each mold.

In a foundry where the air pipes have been led as previously indicated, and hose connections located at convenient points, the portable pneumatic sand sifter is indispensable. In this machine a small amount of air operates a rotary motor which drives

gearing connected to the sieve. Air admitted through a one-eighth inch opening at a pressure of 70 pounds, developes sufficient power to do the heaviest work.

Recent observation of a molding machine in operation at the foundry of the Ingersoll-Sergeant Drill Company, of Easton, Pa., gave the following figures:

On rock drill cylinders three helpers operating a duplex machine can turn out 22 per day. It formerly took four molders to make this output.

In other words, to do the work by hand now being turned out with the air of the molding machine operated by compressed air would cost 100 per cent more than is being paid now.

On rock drill steam chests same machine operated by two helpers produces 66 molds per day. Formerly it required three molders to equal this number. In this case it would cost 125 per cent more to turn out same product by old method.

The economy of the sand blast for cleaning castings was quite as marked as that of the molding machine. On a flask 30"x14"x5" made without using any facing no difficulty was experienced in cleaning six square feet of surface per minute. A box bed plate, weighing 1,700 pounds, was cleaned in one hour by the blast, while another bed plate made from same pattern took 3 hours to clean by hand. With the blast the casting was cleaned so that the chipper did not have to do any cleaning,as he had to do when blast was not used. Neither brushes nor files will get around fins and risers as the blast does.

A very difficult casting with cores, that are almost impossible to get out by hand, was cleaned in 45 minutes by the blast as against two hours and forty minutes by hand.

In this same foundry they formerly melted about five tons of iron per day and employed fourteen molders, eight coremakers and a cleaning and chipping gang of seven.

They have practically doubled their plant and now pour 10 to 12 tons per day and employ 27 molders, 12 coremakers and a number of labor-saving devices to increase their output, but the same cleaning gang of seven men, with the addition of a sand blast, take care of the product and the cleaning is done in a much better manner than previously.

The sand blast not only effects a great saving in the actual cost of the castings, but a further saving through the removal of the oxide, which is so destructive to tools in the machine shop.

This saving on tools is most apparent where the work is milled, as cutters can be run at an increased speed. The sand blast applied to the tumbling barrel is an improvement worthy of notice.

Aside from the economical features connected with the use of the sand blast, it cleans the castings far better than by hand, and where a casting has intricate steam or air passages it is of the greatest importance to be able to thoroughly clean these inaccessible parts.

Associated with the sand blast the pneumatic chipper shows to good advantage.

These tools were formerly too delicate and complicated for foundry uses, but recent improvements have so simplified their construction that they now have only three pieces in their entire make-up, and but one of these is a moving part.

Dark foundries have found the Wells, Lucigen or some similar light of great use where a cheap intermittent light was needed. In these lamps compressed air forces oil through a nozzle forming a spray, which when ignited gives a flame about five inches in diameter and 30 inches long, and of about 1,000 candle power.

The air is used at a pressure of from 10 to 30 pounds, and one gallon of oil and 60 cubic feet of free air per hour suffice to operate the lamp.

These hydro-carbon burners are very useful for skin drying large molds as well as for lighting.

Breaking test bars from each cast is another use to which air has been applied.

A comparatively small air compressor of proper construction and design will furnish sufficient air for all the needs of a foundry of ordinary size.

An illustration in point is a foundry running four cranes of 20, 10, 8 and one ton capacity respectively; a sand blast, two pneumatic chippers, one duplex molding machine, and for blowing out and dusting molds in process of construction.

In addition, the machine shop uses air for testing small engines and blowing out cylinder ports and inaccessible parts after

machining to get rid of oil and chips and for bench dusting and copying letters in the office.

Air at 60 pounds pressure for all these uses was applied by a 14x16x18 compressor, running at 120 revolutions per minute, and furnishing about 500 cubic feet of free air per minute.

This ended the sessions of Tuesday and everyone seemed delighted with the result of the first day's work. Hundreds of new, and, in many cases, valuable acquaintances had been made. A permanent organization, with every prospect of a brilliant future in store, had been formed, several eloquent and instructive addresses had been listened to, and valuable papers on topical subjects of great interest had been presented and discussed.

Wednesday Morning.

Perhaps one of the most interesting features of the entire meeting, because of its giving an exhibition of processes not generally understood among foundrymen, was the first paper Wednesday morning with accompanying demonstrations.

President Schumann introduced Charles James, M. E., of Henry Disston & Sons, Philadelphia, and W. C. Henderson, chemist, of Thomas Devlin & Co., Philadelphia, who gave a very interesting demonstration, following the reading of a paper by Mr. James, on "The Chemistry of Iron with Determinations and Their Value." With the apparatus of the laboratory, Messrs. James and Henderson went through the routine for determinations of manganese, sulphur, phosphorus, silicon and the two carbons. Samples from three brands of pig iron were employed, the three determinations for each element going on simultaneously. The irons were Bushong, of the Reading Iron Co.; Crane, of Crane Iron Co., and Thomas, of Thomas Iron Co. The results were announced as follows.

	Crane.	Bushong.	Thomas.
Graphite carbon	3.50	3.65	3.39
Combined carbon ...	....	0.18	....
Silicon	3.570	3.967	2.917
Manganese	0.368	0.736	0.320
Sulphur	0.011	0.013	0.011
Phosphorus	0.874	0.566	0.678

As a concluding statement, Mr. Henderson made this practical suggestion as to a mixture: By using 30 per cent of Crane, 20 per cent Bushong, 50 per cent Thomas, we would have the following as its analysis: Graphitic carbon, 3.475 per cent; combined carbon, .036 per cent; silicon, 3,323 per cent; manganese. .418; sulphur, .011; phosphorus, 7.14 per cent. This would make a soft, fluid iron in the casting, and easily machined. Strength would not be great, perhaps 20,000 pounds tensile.

In his paper which prefaced the analyses. Mr. James said that chemistry was not intended to supersede but only to aid and strengthen practical foundry experience. The chemical analysis of iron is but the handwriting on the wall and needs interpretation in the light of experience before it can become of use to the iron founder. Having once found by analyses the proportion of constituents of any specially desirable iron, chemistry will enable the iron founder to reproduce these results at any time, and that, too, without slavishly following the rule-of-thumb mixes made from fancy brands of iron bought at prices far exceeding their value. Chemical analysis is therefore related to iron founding by true economy and sound business principles, and no iron founder can any longer afford to ignore it. The speaker then indicated with some detail the apparatus needed for the equipment of a foundry laboratory.

The next paper was one from the pen of D. J. Mallack, so well and favorably known as one of the most eminent practical foundrymen on this continent, on

The Apprenticeship System.

This paper is of sufficient value to be given to our readers entire, and it will appear in our July issue. This ended the business of the morning session.

Wednesday Afternoon.

The first paper read was that of Thomas D. West, entitled "The Utility and Advancement of Green Sand Molding," which aroused some discussion, and which we hope to produce later.

W. J. Keep, of the Michigan Stove Co., followed with another, entitled "Physical Tests and Chemistry of Cast Iron." Mr. Keep had his paper, including some interesting tables, neatly printed in pamphlet form, and anyone interested can secure a copy by addressing him at Detroit, Mich., and enclosing a two-cent stamp for postage. The discussion on this paper, while brief, was yet animated, and participated in by Thomas D. West, James A. Beckett, Joseph Best, S. Groves, James F.

Lanigan, C. L. Prince, C. A. Treat, W. R. Webster, J. Smith and W. P. Barber.

Samuel Groves, of the Taylor-Wilson Co., of Pittsburg, came next with a paper entitled "Gear Molding and Gear Molding Machines." Much of the material contained in this address has been previously outlined by papers from Mr. Groves that have appeared from time to time in THE FOUNDRY, as well as some of the illustrations he exhibited in connection therewith.

E. H. Mumford followed with a paper on "Molding Machines and Their Appliances," which we will reproduce later on.

After its conclusion the Committee on Constitution, through its chairman, Mr. A. Sorge, Jr., presented its report. The committee's report seemed to have the hearty approval of those present, with the exception of two sections covering the requirements of membership and the amount of dues to be paid.

After an energetic debate, lasting for some time, it was decided to hold a business session on Thursday morning, at which time it was expected that such provisions would be made as would render the constitution acceptable to all and remove all room for criticism. An adjournment was accordingly taken at 6 p. m.

Wednesday Evening.

The reception and musical entertainment tendered to the visitors in the evening will be long remembered by those present. The Academy of Fine Arts had been secured for the occasion, and there, amid fine paintings and statuary, some pieces being of national renown and great value, those who attended wandered at their pleasure, amid strains of choicest music. Light refreshments were later on served, and all seemed to enjoy themselves greatly.

Thursday Morning.

The third and last day's session was called to order promptly at 9 o'clock by President Schumann, and after some debate the constitution as presented by the committee was adopted, with one or two minor changes. It was read carefully and approved section by section, and afterwards adopted as a whole, and can be secured by addressing the American Foundrymen's Association, Detroit, Mich.

After the constitution was finally adopted, it was decided, upon motion of Mr. Yagle, of Pittsburg, seconded by Mr. C. S. Bell, of Hillsboro, O., that for the first year the Executive Board should have the authority to pass upon applicants for membership.

S. Groves then moved that in view of the services rendered the convention by Howard Evans and John A. Penton, those gentlemen be at once admitted to active membership. The motion being seconded by C. S. Bell, it was carried unanimously.

The election of officers resulted in the adoption of the report of the Committee on Nominations, without change, as follows:

President—Francis Schumann, Tacony, Philadelphia, Pa.

Vice-Presidents—New England States, F. W. Gibby, Boston; Middle States, Robert G. Taylor, Pittsburg; Southern States, Henry Clay Evans, Chattanooga; Central Western States, John M. Sweeney, Chicago; Southwestern States, W. S. Mosher, Dallas, Tex.; Pacific States, Irving Scott, San Francisco; Canada, Joseph Best, Montreal.

Secretary—John A. Penton, editor THE FOUNDRY, Detroit.

Treasurer—Howard Evans, Philadelphia.

After a few remarks from some of the newly elected officers, resolutions were adopted thanking the Philadelphia foundrymen for their entertainment and for the work they had done towards making the meeting a success, as well as all those who had contributed in a way. The ladies and their entertainment committee were also remembered.

The business being all concluded, the session adjourned amid great enthusiasm.

Convention Notes.

There is a gentleman in Philadelphia very closely identified with the foundry business named Bougher—J. K. Bougher, of whom, comparatively speaking, much is not known outside of those having business relations with the firm of J. W. Paxson & Co. Mr. Bougher entered the business he is now in many, many years ago, when he was a very young man—and he is not an old man yet by thirty years—and he has been with it ever since. There are some people who have the impression that Mr. Bougher is the whole firm, but that is a mistake. Mr. Paxson is still living and retains an interest in the firm, and the only Howard Evans is also very much interested, to say nothing

of Mr. H. M. Bougher, a son of J. K. Well, this Mr. J. K. Bougher is a very modest man, too much so altogether for the business he is in, but he came out of his shell sufficiently to become the moving spirit in an excursion given those attending the convention on one of the handsome steamers that belong to Philadelphia. The boat left the dock early in the afternoon, with the party on board, and ran to Cramp's ship yard, where all had a chance to visit the large and much-talked of foundry presided over by D. J. Matlack and his son George.

Brief visits were also made to the machine shops and a glance given the U. S. cruisers in course of construction.

After a very pleasant visit the party embarked and visited the works of J. W. Paxson & Co., where they witnessed the work of manufacturing many of the articles used in their business and inspected the immense sheds full of molding sand on the dock and pier belonging to the company. As several of their own boats and barges were unloading at the time, the visit was instructive. After taking the boat once more, the party sailed for Washington Park on the Delaware River, where they witnessed the operation of one of the shad fisheries, and saw one of the large nets hauled in containing several hundred fine shad.

After having their photos taken again in a group, dinner was served to as hungry a lot of foundrymen as this country has ever seen, and it was thoroughly enjoyed.

Too much credit cannot be given to those having the affair in charge, for the very excellent manner in which all the details were carried out and for the very enjoyable and elaborate spread they provided.

John T. Brown, manager of the Damascus Bronze Company, Pittsburg, was one of the heavy-weights. He helped to maintain the dignity of the brass and bronze foundry end of the business. He seemed especially proud of the fact that his concern had melted 395,000 pounds of brass in April.

Andrew Banholzer represented the Birmingham Machine and Foundry Company, of Birmingham, Ala.; W. S. Mosher, the Mosher Foundry and Machine Company, at Dallas, Tex., and Thomas Wathey the United Verde Copper Company, of Jerome, Arizona.

Joseph Best, superintendent Warden King & Son, Montreal, P. Q., takes quite an interest in foundry matters, and the convention showed its appreciation by making him vice-president for Canada.

Thomas D. West was a much-sought for man by many who were familiar with his name and had read much of his work at various times.

Philadelphia is very fortunate in having such an institution as the Manufacturers' Club. It serves as an excellent medium to bring together its thousands of manufacturers, make them acquainted with each other, thus inspiring a more friendly feeling among the men who make that city the greatest manufacturing center on this continent.

A great many foundrymen from Western points were surprised at the open nature of the sand, so familiar to Philadelphia foundrymen, that enables them to make castings of thirty or forty tons by merely skin drying the mold slightly. There were some rumors of Western men having stated that the knowledge gained in that line alone more than repaid them for their trip.

Chicago and the Western Foundrymen's Association have reason to feel proud of the record made by the gentleman who came from that city and was appointed chairman of the committee on constitution.

It was generally conceded that his experience as a member of the Western Association and as the one who had most to do with framing its excellent set of rules had much to do with the success of the committee in being able to present in such a short time a constitution that was practically complete, and as far as could be seen at that time could hardly be improved upon.

J. H. Pepper, the capable and courteous representative of the "Iron Age," earned fresh honors for himself and the great paper he represents in Philadelphia by the assistance he gave at various times in aiding the officers of the convention.

List of Contributors to the Entertainment and Convention Fund.

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Robert J. Taylor & Son, Philadelphia.
Tabor Manufacturing Co., Elizabeth, N. J.
Philadelphia Fire Brick Works.
Daniel Eagan, American Steel Casting Co., Thurlow, Pa.
C. R. Baird & Co., Philadelphia.
Henry A. Hitner's Sons.
Whitney & Kammerer.

Western Foundrymen's Association.

The annual meeting of the Western Foundrymen's Association was held Wednesday evening, May 20, 1896, at the Great Northern Hotel, Chicago. The president, John M. Sweeney, occupied the chair, and upon calling the meeting to order read the following report:

"The Western Foundrymen's Association, Chicago, Ill.—

"Gentlemen: Inasmuch as with this meeting will likely be inaugurated those who are to succeed the present board of directors, president, secretary and treasurer of your association, it becomes me to transmit for record in the proceedings of these meetings a report of the conduct of affairs during the past year, and the present condition of the association.

"In addition to the enumeration of such matters as have been accomplished, I desire to call the attention of the succeeding management of the association to one or two things which are in the nature of 'line for

future policy,' without desiring more than to suggest for the consideration of the succeeding officers such things as seem at this time to be proper in the light of the past year's experience, and not in any sense offering to go beyond the idea of such suggestion.

"One year ago, the officers installed at that time, found the association with an enrolled membership of 64. At the present time, the enrolled membership is 114, showing an increase in enrolled membership of 50.

"One year ago, the financial condition of the association was as follows: Cash on hand, $40.86, while the liabilities amounted to $202.

"The financial condition of the association is now: Cash on hand, $368.97, while there are no liabilities.

"For the details of the cash transactions during the year, you are respectfully referred to the report of your treasurer submitted at this meeting.

It seems to be an unwritten understanding, that the regular meeting of the association following the summer months should have some mark to distinguish it from the regular monthly meetings, and with this in view, it was determined to hold the meeting for last September at some other point than Chicago, in order to broaden the field of usefulness, as well as the acquaintance of, and with the association, as fully as could be done by such a course.

"It was, therefore, determined to hold the meeting of last September at Milwaukee, and not only have we to congratulate ourselves upon the success of the enterprise, but to remember with every pleasure, the open hospitality of the foundrymen of that city.

"The success of this meeting was so pronounced, and the beneficial results to the association so evident, that there has been a unanimity of feeling on the part of the directors that the plan should be continued, and in order to give ample time for the diffusion of information concerning the next September meeting, your present Board of Directors, believing that it devolved upon them to take such steps as might be necessary, rather than to delay until the inauguration of the succeeding board, have determined and announced that the meeting of next September will be held at Cleveland, Ohio.

"The institutions of Cleveland covering the manufacture in which we are interested, provide exceptional opportunities for an interesting visit, and I would now particularly recommend that the succeeding directors shall continue and expand the idea of holding at least one meeting annually in one of the cities inhabited by the members of the association.

"One important feature inaugurated within the last year was the incorporation of the association under the laws of the State of Illinois, the adoption of new by-laws, and the change in the methods of conducting the affairs, the substitution of a board of directors for what was previously known as the Executive Committee, and the appointment and induction into active service of an Editing Committee.

"It may be that the near future will determine the necessity of some amendments to the existing by-laws and it is to be hoped that each member of the association will apply himself personally to the consideration of such changes as may be conducive to the rapid growth of the association.

"The thanks, not only of the officers and directors, but also of the members, are due the Editing Committee for the effective manner in which they have performed their duties, which must have been at the sacrifice of much time and personal interest, and I would particularly call attention of the succeeding directors and officers, that they do not allow the duties of the Editing Committee to become so onerous that it will be a hardship to undertake the work of the member of that committee.

"Personally, I wish to extend thanks to the secretary for the very efficient service he has rendered this administration, as well as to the directors and members of committees for their kind attention.

"There has been appointed under a resolution of the association passed at a recent meeting, a committee to report on the best method adapted to the regulation of apprenticeships. I look forward with much interest to the work of this committee, and trust they may receive every assistance within the power of our members in the work which is before them.

"From foundrymen whom this report may reach, and are not thoroughly familiar with the objects of this association I respectfully ask investigation.

"Endeavoring to place foundry methods and management without the rule of thumb, by interchange of experiences and ideas, the proceedings of our meetings followed up and studied, must be pronounced of great benefit.

"It has been and is the set purpose to lay an independent course, and set up a standard for technical work clear of trade or commercial questions.

"Respectfully submitted,

"JOHN M. SWEENEY, President."

Secretary's Report.

The report of your secretary will be brief. The membership a year ago was 64—this evening we have on our roll 114, an increase for the year of 50. The interest shown in the meetings and work of the association has not been confined to our members, but has been manifested by foundrymen in all sections of this country and even in Europe.

From time to time your secretary has received communications from foundrymen, who were not members, commending in high terms the excellent work being done by this association. On several occasions we have received copies of English trade journals containing extracts of papers read at our meetings, but I regret to say proper credit was not always given either to the author or to the association. The Topical Questions have proved to be exceedingly popular and profitable, and it is to be hoped the members and foundrymen generally will continue to use this excellent medium to gain information.

The papers read before our association have been extensively published by the trade papers of this country, and in this connection I think special mention ought to be made of the very great assistance given us by them in publishing notices of the meetings, and afterwards, in some cases, a very good report of our proceedings.

I would specially mention The Iron Age, The Iron Trade Review, THE FOUNDRY, The Age of Steel, The Engineering News, The Industrial World, The Journal of Commerce, for the valuable space they have given us. The Iron Trade Review very kindly agreed to print our proceedings without any charge, such was their interest in seeing the association prosper, and I am glad to say they have fulfilled their promise very faithfully.

All the meetings have been held in Chicago, with the exception of the September meeting. On that occasion we accepted the invitation of the foundrymen of Milwaukee, Wis., and went to that beautiful city, where we held a two-days' session. Much good was derived from this special meeting, and the association gained 15 new members.

The following is a list of the papers and discussions of the year:

June: "What is the cause of small, round clean holes in castings in the solid parts?" "Cranes," by T. D. West.

July: "The Future of the Western Foundrymen's Association," by H. S. Vrooman.

September: "False Economy in Foundry Equipment by H. Hansen." "An Example of Cost Sheets for Foundries," by A. Sorge, Jr., M. E.

October: "The Modern Jobbing Foundry," by James A. Brady.

November: "Stretching Cast Iron and Elements Involved in Its Contraction," by T. D. West. "Properties of Cast Iron Shown by Keep's Cooling Curves," by W. J. Keep.

December: "Care of Patterns and Pattern Account," by P. S. Dingey.

January: Topical questions. (1) Does the employer derive any benefit from compelling molders to remain in the foundry until quitting time, if their molds have been poured off before? If so, what benefit? (2) Are there characteristic conditions in foundries which necessitate different practice and management from those followed in other industrial pursuits? (3) Is a molder in fit condition to do further work after he has poured off his day's molding?

February: "Oil as a Fuel for Core Ovens," by H. Hansen.

March: Topical Question. (4) Is it desirable to have a recognized apprenticeship system, and if so, what is the best form?

April: Topical question: (5) Are foundries generally noticing an irregularity in the foundry pig iron? If so, does the irregularity exist more generally in northern than in southern irons? Does it apply to both charcoal and coke irons, and in your opinion is any of the difficulty traceable to an extreme desire on the part of furnaces to supply their Bessemer pig iron trade at the expense of their foundry trade?

A committee consisting of Messrs. Ferguson, Oehring and Carver was appointed in March to thoroughly investigate the ap-

prenticeship question and report at our September meeting.

A committee on headquarters for the association endeavored to make arrangements for a suitable place for this purpose, but asked to be discharged for the present, pending action of another organization, which was done. This question will probably come up again. Dues collected amounted to $1,021.25. The average attendance at our meetings was thirty-eight (38).

A new set of by-laws was prepared and adopted by the association December 18th, 1895.

The secretary desires to thank the officers, board of directors, editing committee and members for the very kind consideration shown him at all times, and for the assistance given in conducting the duties devolving upon him.

Respectfully submitted,

S. T. JOHNSTON.

Treasurer's Report.

The treasurer, Mr. O. T. Stantial, then submitted his report, which summarized was as follows:

Balance on hand at beginning of term	$ 40 86
Receipts during term	1,021 25
	$1,062 11
Disbursements, of which $202 was indebtedness from previous term	693 14
Balance on hand	$369 97

The foregoing reports were accepted and ordered placed on file.

The following applications for membership were then submitted:

South Pittsburg Pipe Works, South Pittsburg, Tenn.; W. A. Jones Foundry and Machine Co., Chicago, Ill.; McDowell Steel Co., Chicago, Ill., and Samuel H. Whitaker, of the Dayton Coal and Iron Co, Cincinnati, O.

On motion, duly seconded, the applicants were elected members of the association.

The election of officers for the ensuing year then proceeded.

A. Sorge, Jr., M. E., was elected president, but resigned in a short speech, in which he heartily thanked the association for the high compliment paid him, but stated that he thought he could serve the association better out of the presidential chair than in it. His resignation was accepted.

The meeting then adjourned, and a meeting of the board of directors was called at once. At this meeting officers qualified as follows:

President, A. W. McArthur; vice-president, Wm. Ferguson; secretary, A. Sorge, Jr.; treasurer, O. T. Stantial; directors, J. M. Sweeney, W. M. Moore, C. A. Sercomb, S. T. Johnston, G H. Carver; editing committee, B. M. Gardner, J. K. Mackenzie, H. S. Vrooman.

The Franklin Institute.

America's greatest mechanical home, the world-famous Franklin Institute, which has been selected as the subject of our front cover design for this issue, was founded in 1824 by a few enthusiasts who little thought of the probable future prosperity and fame of the structure they labored so hard and long to see fairly under way.

Dr. W. H. Wahl, who was its secretary from 1870-1871 and from 1882 to the present time, has written a history of this remarkable and venerable American institution and from it we learn that its inception was really owing to the fact that the gentleman most instrumental in getting together those who aided in holding the initial meeting was mainly inspired by the fact that he was black-balled in an attempt to secure admission into a mechanics' institute because of his lack of mechanical experience and ability.

This gentleman, whose name was S. V. Merrick, found himself at the age of twenty-one "the owner of a workshop without a mechanical education, and with scarcely a mechanical idea." To improve himself he took the steps referred to and with the aforementioned unsatisfactory result.

Piqued at this discouragement he, with the aid of one or two friends, succeeded in getting together fourteen gentlemen who then and there laid the plans that subsequently resulted in the formation of the Franklin Institute, at a meeting held February 24, 1824. Since that date it has grown until thousands of names have been added to its roll, and it has been the recipient of many benefactions from legacies and gifts from the living. Most of these have been in the shape of substantial sums of money, while there have also been valuable bequests

of books and other articles of mechanical or scientific value. The board of managers very generously permitted the use of the historic hall for the holding of the meetings of the American Foundrymen's Association, the delegates to which appreciated greatly the opportunity it gave them of becoming acquainted with this famous building.

The following is a list of those in attendance, arranged alphabetically:

CAST IRON NOTES.

Devoted to Inquiries from Practical Foundrymen on the subject of Melting and using Cast Iron. Address all Inquiries to W. J. KEEP, care of The Foundry.

Regulating Foundry Mixtures by Chemical Analysis.

A few months ago the Western Foundry Association discussed the question as to whether pig iron was graded as carefully as in former years.

There must have been something to suggest this question, and the same inquiry is reaching THE FOUNDRY from time to time.

The appearance of the grain of pig iron is not a certain guide to the founder as to what kind of castings the iron will produce, but an even open grain or a uniform close grain is generally an indication of good iron.

Whether either grade is suitable for a particular class of castings depends practically upon the amount of silicon that the iron contains. This amount can be determined by chemical analysis.

The common method, however, is to add a portion of a new iron to a mixture of iron that has been working satisfactorily, and measure the shrinkage of a test bar. If the shrinkage is increased the new iron needs more silicon. That an increase of silicon will soften iron and darken the grain has not been understood until within the past 10 years, and very few founders understand it now. If the founder could understand that some of the irons in his yard contained more silicon than other brands, and that by varying these irons he could produce the grade of castings that he required, and that this is the way to vary silicon, it would remove all mystery from iron mixing. The measure of shrinkage is the best and easiest measure of the influence of silicon.

While silicon is the only element that can soften cast iron it exerts its influence indirectly, through the carbon that the iron contains. If there is too little carbon the silicon can do no good. The more carbon the less silicon will be required.

There are some who strongly advocate selling pig iron by chemical analysis. By this is meant that each furnace cast shall have its silicon determined, and that the iron shall be guaranteed to contain a certain percentage of silicon, although they do not guarantee closer than half of one per cent.

If iron is purchased by analysis the furnace people insist that the appearance of the fracture is of no importance, and if the iron gives trouble will not allow it to be blamed.

The experience of all who have endeavored to mix irons by chemical analysis is, that they do not always get the same results with the same percentage of silicon. This is not the fault of analysis, but is a result that is sure to happen, because carbon is sure to vary, and there are various other conditions that prevent silicon from doing what is expected of it.

This is the reason that I say that the founder does not want to know the percentage, but whether he needs more or less silicon.

This brings us back to the quality of pig iron. It is the custom of some modern furnaces to heat the blast so hot that they use less fuel per ton than formerly, and they drain the furnace so fast that the iron comes through faster.

This practice allows the iron to take up less carbon than formerly, and more of it is in the combined form.

It takes more silicon, therefore, to produce a given result, and sometimes the carbon is so low that the iron cannot be softened by adding silicon.

This modern practice may be the cause of a closeness of grain around the edges and in spots at the center of the pigs. At all events, simply knowing the percentage of silicon in the pig iron will not insure uniform castings.

It may be necessary to purchase iron at furnaces which run slower and which impart a higher percentage of carbon.

Many founders are talking wisely about buying iron on a guaranteed analysis, without reference to a good grain, when all the analysis they hear of is for silicon, and they do not seem to know that a lack of carbon in the same pig iron, or poor coke to melt with, will require the use of more silicon.

When the founder depends upon a furnace analysis he depends upon a very indefinite thing, and puts himself entirely at the mercy of the furnace, while if he trusts to his eye and to a measure of shrinkage he has some chance at least.

Of Interest to Brass Founders.

Since the introduction of iron flasks for brass founders' use many years ago, no improvement had been made in their design until the Improved Rib Flask was successfully introduced to the trade last November. This is the invention of R. M. Barnett, general manager of the Brass Founders' Supply Co., 20-34 Prospect street, Newark, N. J. Mr. Barnett has had a long experience in the foundry and machinery business, and knows what is needed in the line of flasks

The improved rib flask embodies all the merits of other designs in addition to the advantage arising from the ribs, with which it is made.

As simple as this new feature may at first seem, it is of great advantage, giving additional strength, and also preventing the mold from shifting, ensuring more perfect castings.

The Brass Founders' Supply Co. have expended considerable time and money constructing special machinery for producing flasks that are absolutely true and interchangeable, and are the leading manufacturers in this line. They are well equipped for making special designs, from drawings or description. In addition to their large output of flasks, they maek and deal in a full line of other necessaries for the brass founder, including molding boards, tumbling barrels, sprue cutters, mortars and pestles, magnetic separators, spill troughs, clamps, etc.

All Not Gold that Glitters.

Well, this prison factory business is not all it seems after all, not even from the standpoint of the State. We notice that the State of Indiana has been compelled to adopt vigorous measures to collect from the lessees of their convict labor at Jeffersonville. This has been done by obtaining a judgment for $28,000 in the courts and levying on the property of the Patton Manufacturing Co., who leased the labor under contract but had failed to pay therefor.

The Diamond Iron Works, of Minneapolis, Minn., have recently gotten out a "gang saw mill" which weighs complete 8½ tons. One of the wheels measures 14 feet in diameter and is split vertically and horizontally. A full base plate is also included in the outfit. The quality of the castings is "A No. 1." This shop, while not a large one, has turned out numerous heavy jobs, but this "gang" is of special credit to the firm and the workmen in their service.

The St. Paul Stove Works have resumed operations.

Frank N. Scott, St. Paul, has recently obtained a patent for a molding machine.

The Diamond Machine Co., of Providence, R. I., are shipping to the Japanese Government a large order for grinding machinery received through their London house. The shipment comprises a large number of articles; among others it includes ten of their large size water tool grinders.

In removing a cast iron bushing of a locomotive cylinder recently at the Baldwin Locomotive Works, the excellent quality of the iron was strikingly illustrated. The cylinders were originally about 20 inches in diameter, and for some reason had been bushed to 19 inches by the builders. It was decided to remove the bushing, and it was cut out with a boring bar until a thin shell was left in which the metal was 1-32 to 1-8 inch thick, forming a complete cylinder. When the shell was cut open the metal spread out flat like a piece of sheet iron.

The P. H. & F. M. Roots Co. have by pressure of business been compelled to open a New York office for their goods and have secured quarters at 109 Liberty street, where Mr. J. B. Stewart will preside.

Their old agents, Cooke & Co., will continue to serve them whenever possible, but their business had grown to such proportions that a resident agent who could devote his entire time to its interests was required.

A TECHNICAL JOURNAL DEVOTED TO FOUNDRY INTERESTS.

THE FOUNDRY

Published Monthly by

"The Foundry Publishing Co."

DETROIT, MICH.

JOHN A. PENTON,

EDITOR AND PROPRIETOR.

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THE TRADE.

The foundry business is in about as uneventful a condition as a becalmed sailing vessel. Everybody is somehow imbued these days with the lethargy of waiting.

A certain proportion of the people who project or back great enterprises have said "this is a bad time" and their backwardness has impregnated the entire community. Until these people get ready to tell us we can go ahead and transact business, there is nothing for us to do but sit still and wait their supreme pleasure.

This means that until they are satisfied with the result of all these nominating conventions, satisfied with the mythological, meaningless and empherial articles called "platforms," satisfied that their man will be President and that the Congress to be elected will do as it is told, why until then they just won't play in anyone's back yard, and we might as well all go fishing—provided, of course, we can get the money to buy bait. The foregoing may appear far-fetched, but it comes very nearly being the truth. Some people make money in hard times, though, more than at any other period. The fellows who have got the cash with which to gather in the thousands of bargains to be seen on every side are the ones this kind of a harvest is for. As for the rest of the community, why, they are expected to live on hope or wind without any dessert. Quite a large volume of business is, of course, being transacted, but the number of people trying to receive a share of it has the effect of reducing the margin so that in many cases the difference between those who receive it and those who do not is very small.

A Questionable Practice.

Occasionally we have read complaints in English mechanical papers to the effect that it was no uncommon thing for Americans to appropriate British ideas or British machinery without any ceremony. We have frequently noticed, however, a sad lack of courtesy in this respect in English papers themselves, the most frequent transgressor being the "Mechanical World," published in London. Several times during the past year has our attention been drawn to this, and twice within a few days.

In the first case the secretary of the West-

ern Foundrymen's Association made special reference to this in his address at their last annual meeting, and we have a complaint from Mr. E. H. Putnam, who has contributed to various publications on foundry topics, that an article appearing in our May issue and copied from the Mechanical World was really taken by the latter from The Tradesman without giving any credit whatever. This same thing has happened so frequently as to preclude all possibility of its being a mere oversight.

The Scrap Heap.

English iron makers are at last beginning to realize the possibility of severe competition from this side of the Atlantic.

At a recent meeting of the British Iron Trade Association it was conclusively shown by the author of a paper on the subject that a peculiar combination of most favorable conditions exists in Alabama and that iron is being produced there at a much lower figure than is possible in Great Britain.

* * *

Of course at present freight rates prohibit the exportation of American Iron to England, but on the other side of the water they are beginning to wonder how long that is going to last.

* * *

If these meetings of Foundrymen do no other service worth speaking of, they have the effect of bringing to the front a number of bright men who begin to take immediately an increased amount of interest in foundry matters.

* * *

Foundrymen are beginning in a most wonderful degree, comparatively speaking, to consider and discuss foundry subjects and problems that a few years ago were considered only fit for scientists, but as they grow more familiar their ambition becomes stirred, a thirst for more knowledge is acquired and after they attend a meeting where they make the acquaintance of others better informed on some subject than themselves they begin to realize the importance of being posted and to naturally take an increased interest in subjects before not considered.

When Mr. Sorge contributed to THE FOUNDRY a few lines a couple of months ago concerning the effect a certain condition of the atmosphere might have on the melting process in a cupola, it might be supposed by some that he was tackling a rather fine subject, but the evidence at hand goes to prove that even such subjects as that have had their share of consideration. This is only mentioned as an illustration, but it proves what we have before claimed, that there is a surprising amount of knowledge as well as a surprising amount of ignorance concerning foundry matters.

* * *

Judging from a recent issue of the Iron Molders' Journal there is some slight dissatisfaction in certain quarters among the members of the union concerning the agreement at present existing between the union and the Defense Association. This is another one of those occasions that furnish material for strengthening the position of those people who take a decidedly pessimistic view of the future of the workingman, or those who consider them ungrateful, incompetent to manage their own affairs or lacking knowledge concerning what is best for their own interests.

* * *

Nothing that has happened since the formation of this same union has done as much for it or its members as the agreement entered into by its officers and the officers of the Stove Manufacturers' Defense Association.

* * *

Not only has it for several years—the most of them years of great business depression—prevented any reduction in wages, and at times, too, when reductions were universal in every other line, but this agreement has been a source of great benefit to them in many other ways, as it carried with it many concessions of value, in the matter of apprentices, hours of labor, method of payment, etc., and best of all provided a safe and sure means of preventing future troubles.

* * *

If one firm desired to reduce wages or impose conditions that would be unfair to employes or other concerns engaged in the same line of business a committee representing

both oraginzations met and settled the trouble, and it is fair to presume that it would be settled fairly.

* * *

The same rule has held good where perhaps a number of employes, acting under improper advice, have attempted to impose unjust conditions and involve their whole organization in a trouble that would have been sure to result disastrously.

* * *

And now a few restless spirits are desirous of abrogating an agreement that has brought peace and more prosperity than could have been otherwise secured and has besides helped to unify their society and disarm its critics.

* * *

Is it any wonder that those who try to befriend workingmen feel the uselessness of the work occasionally and become discouraged.

Krank's Korner.

Nothing connected with the foundry business has made a more noticeable improvement during the past decade than the architecture of buildings for that purpose. It is pretty hard to knock some things into the foundry, but judging from the appearance of later-day foundry buildings somebody has been under the drop and taken a tumble.

* * *

There are plenty of the old outrages on a patient set of toilers yet remaining, and a few are going up, but this is an exception rather than the rule. The trouble all along has been that foundry buildings have been constructed like other buildings, without regard to the fact that different industries require different buildings just as well as tools. In a general way the past generation covered a piece of ground with some sort of a shanty, and when it had been decided how much room should be allotted to the foundry a partition was nailed up to mark the boundary line and protect the rest of the inhabitants from being annoyed by the dirt and heat thrown off from the foundry. What a noble inspiration to thus protect our stepbrothers and utterly ignore the Turkish bath with dirt thrown in free of charge that has been bestowed upon the crew in the foundry as a customary adieu to a hard day's work.

* * *

Things are not improved because we talk and write about them. If such were the case, the praying, cursing and growling that has been indulged in by the unfortunates who have been compelled to work by feeling in ill-lighted, badly ventilated caves, and left them exhausted time and again after pouring their work off in a semi-blind condition, would surely have procured better quarters. The reason the foundry is being provided with better buildings lays a great deal closer to a foundry proprietor's pocketbook than it does to his benevolence and sympathies.

* * *

It has been practically demonstrated that men will do more work if their surroundings are such as to permit them to remain in the best physical condition. Of course, there are some who will deny this, and say that they have received no substantial increase in output from furnishing their men with more comforts, but their claims as to the causes thereof are deceptive. If they would credit them to poor management instead of to the meanness of their employes they would come nearer the truth. The law that the easier you make it for a man to do a certain piece of work the quicker he will do it has never yet been successfully challenged and proven otherwise. It applies to the foundry as well as to any other industry, and although it was slow in manifesting itself in our line, being like everything else that enters the foundry shipped by freight, and a slow one at that, yet we may from this time on look for a greater development along the lines laid down by this irrefutable law.

* * *

We know that when a man enters a foundry he is usually hiring out for a tough man, but no one will deny that even a tough man is to a great extent incapacitated for his work on the following day by the exhausted condition in which he leaves his work. The best of mechanical appliances are of no greater help and favors rapid production no more than the best of buildings with such appurtenances as will maintain and produce for its inhabitants a normal condition of their surroundings.

Fresh air, light and a comfortable temperature are as much aids to the highest productive capacity of a foundry as they are to the convalescent patient in a hospital. They are as needful to the healthy as to the sick, and he who procures them has got a decided commercial advantage that has been but slightly recognized in the foundry. The surroundings of men are much more of a factor in effecting a permanent stability of their employers than has heretofore appeared possible.

CORRESPONDENCE.

Spatters from a Foundryman's Pen.

It has often been asked, does it pay to have men to clean up the foundry and run the rumblers at night? How many shops do it, and what is their ideas on the subject? The foundry which is in my mind is a bench shop, employing about 40 molders. When the cast is off the foreman goes around with the night men showing them what is to be pickled and what is to be rumbled, keeps part of the shifters to help break off the work, and in an hour the shop is cleaned. When the barrels are filled the night men wheel out the sprues. The result is that next morning the work is in the shipping room, foundry cleaned and the foreman has that time to devote to getting his orders under way, looking after his molders and not "cussing because he ain't got this or that floor ready."

Many a dollar leaks out in a year by molders waiting to get a man to remove sprues and work so he can put out his molds. The cost of running the barrels depends upon the work done. In this work the extra head of steam which has been carried to run the blast engine, with about 500 pounds of coal, will see the engineer through the night, as the rattlers only run about three or four hours. It certainly pays or else why do they do it? If not in dollars and cents, in "peace of mind," especially when you have work from two or three floors to get off by the first train in the morning. T. A. V.

Management of Cupolas.

Mr. Editor—In The Foundry of April there appeared an article under this name. While I quite agree with the gentleman in the facts of mismanagement being the cause of most of the mishaps, and that proper charging is the secret of successful melting, etc., etc., I cannot agree with him in the method by which he finds the bed for a cupola, using another size for a base of operations. I think I can show why this is not correct. In the first place we will take the formula and find, figuring from a 30 inch, what should be the bed for a 60-inch cupola, 30:60::450=900 pounds. This means if a 450-inch bed is right for a 30 inch, 900 pounds is the proper bed for a 60 inch. I take it that in figuring from this the conditions should be the same in both cupolas regarding height of tuyeres from sand bottom, etc. As a matter of fact, 900 pounds will fill the 60-inch cupola only one-half as high in inches of coke as it does in the 30-inch cupola; therefore the conditions are changed and the bed is not right. We will take a different cupola and endeavor to show by two ways, that are very nearly correct as far as getting beds of different sizes equal to their respective capacities. I don't wish to say that they are the correct bed, but the charge in each will be the same according to its size. We say a 30-inch with a 450 pound bed. Now we wish to charge a 42-inch; the tuyeres in each cupola are of the same height from sand bottom, etc. Now as circles are to each other as the squares of their diameter, we find that the square of 30 inches is 900 inches, and that the square of 42 inches is 1,764; then we have 900: 1,764::450=882, the required bed. The charge of iron on the bed would be found in this way also 900:1,764::1,000=1,960. Now if this is right it ought to bear inspection or prove itself. In 100 pounds of coke there are practically 5,760 cubic inches (as the coke comes from the shed). There are 450 pounds of coke in the 30-inch bed, so there are in the 450 pounds of coke four and a half times 5,760, or 25,920 cubic inches, and as the area of a 30-inch circle contains 706.86 cubic inches, the bed will be as many inches high as 706.86 is contained times in 25,920 or 36 inches, and if 882 pounds is a true bed for a 42-inch, it ought to reach the same height. In 882 pounds of coke there are 51,023.20 cubic inches. The area of a 42-inch cupola is 1,385.45; this divided in the same manner as the above will show that there are 36 inches of space occupied in this cupola also. There are in a 60-inch cupola, 36 inches

in height, exactly four times as many inches of space as there are in a 30-inch cupola, 36 inches in height, consequently it will take four times the fuel to fill it, or 1,800 pounds of coke for a bed for this size, and 4,000 pounds of iron for a charge. The square of 30 being 900, and of 60, 3,600, then 900:3,600:: 450=1,800, and for the first charge of iron 900:3,600::1,000=4,000.

GEO. BUSCH.

Fostoria, O., May 25, 1896.

Mr. Editor—I have read with a considerable interest the article in your April number, "Management of Cupolas," by E. Grindrod. A similar article appeared in a recent number of the American Machinist, and as the latter used for example a cupola the exact size of the one used in our works, I will quote figures from it. Mr. G. appears to have had a great deal of practical experience in the management of cupolas, and has figured it down to a fine point, even to a pound of coke. I said to myself, well, now I have something definite to work from; I will see how far we are out of the way and at once set that matter at rest.

The experience of Mr. G. has enabled him to fix a base that is absolute, and all that is necessary to ascertain just how much coke is necessary to melt properly a given quantity of iron, apply the simple rule of three.

The example given by Mr. G., and which forms the base of operation, is a cupola, 30 inches inside diameter and 15 inches from bottom of tuyeres to iron bottom of cupola. This is the exact size of our cupola, so there is no danger of any mistake in the use of the rule of three. The first charge requires just 571 pounds of coke and 1,250 pounds of iron. The second and other charges, 75 pounds of coke and 1,250 pounds of iron. Now, what do I find that we have been doing for many years, every day, just because we didn't know any better?

For first charge we use 160 pounds of coke and 1,250 pounds of iron; for the second and other charges, 60 pounds of coke and 1,250 pounds iron. I said to our cupola tender, it does seem too bad that there should be such a difference, somebody must be mistaken; but I advised him to keep right on in the same old way until we learned more about it. I would be very glad if some foundryman who has not had so much experience as Mr. G. would tell us why this great difference in experience and practice.

N. PORTZ,
General Manager of the Brass and Iron Works Co.

Warren, R. I., May 23, 1896.

Mr. Editor—"There is nothing new under the sun" was said by an ancient philosopher. We are inclined to think the above saying is proved incorrect by your correspondent in April number, page 349, "Management of Cupolas." This writer has had 35 years' experience in a foundry, and of course knows what he is writing about. His formula for charging cupolas by direct proportion of the diameter is new. In our school days we were taught that the areas of circles were in proportion to the squares of their diameters. We will, for an illustration, take his cupola of 30-inch diameter and 12 inches from top of sand bed to bottom of tuyeres, with 450 pounds of fuel as correct. We will take another cupola, 100 inches in diameter and 12 inches to bed top as before. Your correspondent says 30:100::450=1,500 pounds. That is, 1,500 pounds of fuel in the bed. This is about 28 cubic feet of coal and would give a depth of six inches of fuel on the bed. How would the iron melt six inches below the tuyeres? Is it not a fact that if his 30-inch cupola was charged correctly, his 42-inch should be as follows, 30:42::450=883 pounds, or 40 per cent more fuel than he has used for 35 years? We will be pleased to see your comment in the next issue of your valuable paper.

Very truly yours,
WARREN FOUNDRY & MACHINE CO.

Mr. Sorge Replies.

Chicago, June 3, 1896.

Editor The Foundry—In your May issue I find a communication from Mr. C. E. Stone, which starts out by apparently criticizing my article on "The Effect of Atmospheric Temperature and Humidity on Melting Iron in a Cupola." Mr. Stone states that this article "is disappointing in that it does not treat the subject as elaborately as its importance demands. A theory nicely written out and backed up by algebraic formula sometimes fails to carry conviction or satisfy the people in the office, whilst at the cupola, nine times out of ten, it is as a foreign language."

I take up a portion of your valuable space to call Mr. Stone's attention to the fact that my article did not contain a single algebraic formula of any kind, therefore this apparent sarcasm falls harmless. As to any attempt that I might make to instruct cupola tenders how to figure out the amount of fuel necessary to add or abstract from their usual charges in order to counterbalance the varying temperature and humidity of the atmosphere, I confess that to me life seems too short to attempt it.

In my article I stated that I considered it worth a foundryman's while to go into this matter and figure out for himself the different amounts of coke required under various conditions of moisture and temperature. It is not possible to give a rule which shall apply to all cases, as the conditions of melting iron vary in almost every foundry, and these conditions must be taken into consideration.

I shall be pleased to correspond with any of your readers on this subject and advise them professionally in any individual case they may desire to submit, but my article was written for the instruction of foundrymen, and I did not attempt to give rules for office clerks or cupola tenders.

A. SORGE, JR., M. E.

More Criticism.

Mr. Editor—I agree with Mr. C. E. Stone in his statement in the May FOUNDRY that the article by Mr. A. Sorge, Jr., M. E., in the April number, on "The Effect of Atmospheric Temperature and Humidity on Melting Iron in a Cupola" is somewhat disappointing, as it does not touch upon the reasons why such changes in temperature and humidity produce the effects mentioned, but I am glad that the subject has been taken up by one who is so well qualified to investigate the matter thoroughly, and whose standing in the foundry business is such as to insure his opinions that careful consideration which they deserve.

That there is a difference in the working of a cupola, melting the same mixture of iron on different days, due to atmospheric changes, is too well known to admit of a doubt, but almost every foundryman has a different theory as to why those changes take place. It is also well known that more fuel is necessary under certain conditions when the temperature of the blast is 32° F. than when it is 62° F. But it would seem to me that the ratio of fuel to iron given, viz: One to eight, was sufficiently high to overcome any difference in temperature mentioned, unless the fuel used was anthracite coal, or in a case where extra fluidity in the iron was desired.

There is considerable difference in the working of different cupolas. Some are more easily affected by a change of temperature or humidity than others. The writer had this matter very forcibly impressed upon him while running two cupolas of the same size, 48-inch diameter, using the same fuel, the same iron and the same kind of blast. One was a common straight cupola, the other a Collian cupola. The first required a larger per cent of fuel and was visibly affected by every change, while the other was only slightly affected, and it was only necessary to increase the fuel during zero weather. The reason why the latter works best is probably due to the fact that owing to the additional supply of oxygen delivered at the melting zone by the upper row of tuyeres, a larger proportion of the carbonic oxide, formed by the oxygen of the air delivered at the lower tuyeres uniting with the carbon in the fuel, is converted into carbonic acid gas, thereby effecting more complete combustion. This probably also accounts for the greater efficiency of a cupola having two rows of tuyeres set at a proper distance apart.

Turner in his "Metallurgy of Iron," page 168, quotes C. Cochrane as follows: "The carbon burned at the tuyeres is converted into carbon monoxide with the liberation of only 2.473 calories. This monoxide converted into carbon dioxide, each unit of carbon yields 8.080 calories." While this efficiency may not be reached in cupola practice, the fact that when properly charged this kind of cupola shows no flame at the charging door from the opening of the upper tuyeres until near the end of the heat, shows that a large proportion of the gases are burned at the melting zone.

The writer has for several years been interested in studying the effect of humidity in the atmosphere on melting iron in the cupola, and began in 1893 to note daily the changes in the air taken from the blast pipe within 20 feet of the cupola, and at the same time to observe what effect, if any, moisture

in the air had upon the working of the cupola and also to determine if possible whether the results were the same when the same degree of moisture prevailed. In order to secure more frequent comparisons, the humidity of the blast was kept uniform by artificial means; the results were practically the same as when the same degree of saturation existed from natural causes.

During two years careful study of the matter on these lines, there was so much variation in the results on different days when the humidity was the same, and the result as a whole was so much at variance with what I had expected that I was led to believe there must be other causes which were not fully understood by any of the authorities within my reach.

Since I first gave the matter any thought, it has seemed to me that the decomposition of the water which existed as moisture in the blast should result in the production of enough heat to nearly, if not quite, replace the amount absorbed in the change, and have read everything that came within my reach which shed any light upon the subject. Sir Lowthian Bell, in an exhaustive chapter on hydrogen in the blast furnace, dealing with the subject of moisture ("Principles of the Manufacture of Iron and Steel," page 321—), says: "There is of course no doubt that the moment water, in the form of steam, meets with highly-heated iron or carbon, the latter substances are oxidized, hydrogen being liberated."

If, as Mr. Sorge says, the changes mentioned are entirely due to moisture in the air, that moisture must be turned into steam when it comes in contact with the hot fuel and iron in the cupola, it is doubtful if much more heat is absorbed in the operation than is produced by the combustion of the hydrogen in the melting zone of the cupola. As hydrogen is one of the great heat-producing elements, Bell gives 34,000 calories as the heat produced by each unit of hydrogen. It would seem that the presence of moisture in the blast would not fully account for the uneven working of the cupola, unless to again quote from Bell: "The presence of hydrogen gives rise to a decomposition of carbonic acid as mentioned in the same chapter ($CO.^2+H.^2=C.O.+H.^2O.$)" Although this is given by the author by way of inference only, may it not furnish a reason for the loss of heat in the cupola when apparently no such loss should occur. If that is what actually takes place, it will account for the difference which has been noted in the working of the two types of cupola, under almost identical conditions, as the effects of the decomposition of carbonic acid would be most readily detected in the working of the cupola which produces the smallest percentage of that gas per unit of fuel used.

The statement in Mr. Sorge's article, "That any moisture in the blast must be brought to the temperature of the gases which escape from the top of the cupola, or in the vicinity of 500° F., is misleading, or at least liable to be misunderstood, inasmuch as it fails to convey an idea of what actually takes place in the cupola. As the chief reason why any of the gases escape at that temperature is because the descending stock in the cupola absorbs a large portion of the heat which the gases contained when they left the melting zone. It is well known that all the air which passes through the cupola after complete fusion commences, and until the last of the stock has reached the melting zone at the end of the heat, acquires a temperature several times greater than 500° F. If any one doubts it, let him put a wire screen upon the charging door of the cupola, and through it watch the last charge of iron until it goes down out of sight; no other proof is necessary.

The subject, as a whole, is one that has for a long time occupied the minds of the most progressive men in all branches of the foundry business. As it confronts every one who has to do with the melting of iron, whether in the cupola or in the reverberating furnace, in a greater or less degree, the discussion of it cannot fail to result beneficially to all by bringing out the ideas and experience of those who have been studying the matter from different standpoints. The progressive melter will probably agree with me, that until we are more fully acquainted with the causes which produce the changes in the working of a cupola, there is but little use of formulating a table for the increase of fuel where the ratio given (1 to 8) is already too high for ordinary practice.

JAMES A. BECKETT.

You have an excellent paper. I could not be without it.

G. B. ZIMMERMAN,

Personal.

James Salmon has been appointed foreman of the Western Tool Co.'s foundry at Jefferson, Ia.

Thomas Henry, of Lambert's foundry at Ironton, Ohio, goes to Middlesboro, Ky., to take charge of the foundry of the Middlesboro Foundry & Machine Co.

Among the Foundries.

The Loeb Foundry Co., of Decatur, Ill., have changed their name to the Decatur Malleable Iron Works.

Fisher's foundry at Macomb, Ill., have recently installed a new whiting cupola and root blower.

The St. Louis cyclone damaged the Carondelet foundry to the extent of $1,000 and the Aetna Iron Works, $10,000.

The Stillwell-Bierce & Smith-Vaile Co., at Dayton, O., have received an order for one hundred and fifty pumps from the Russian Government.

Butterworth & Lowe, of Grand Rapids, Mich., have purchased the bulk of the property of the brass machine works, which failed a couple of years ago. Their purchase includes both the Grand Rapids and Benton Harbor properties.

The large and well-known foundry of S. E. Cleaves & Son, at Hancock, Mich., will be sold by auction in Marquette August 17. The sale is to satisfy a mortgage of $52,000, and the plant is said to be worth $100,000.

Humphrey & Sons, at Joliet, Ill., are adding a large addition to their foundry. It will contain six pneumatic cranes.

They have a foundry out at Fairbury, Neb., in which a new (?) experiment has recently been tried. The cupola tender thought it would be a good plan to fill the cavity under the cupola with water before dropping the bottom. It would save him the trouble of putting on more later on. He tried it once and after the fragments have been gathered together and an estimate made of the damage done to building foundry machinery, and those in the vicinity a more accurate inventory of the result will be possible than can be had at this time.

E. G. Heinlen has purchased the Schuch foundry at Burlington, Ia.

Horrobin & Vincent, of Cohoes, N. Y., have made an assignment.

The Filley foundry at St. Louis, Mo., lost its roof during the recent cyclone.

The Plymouth Foundry Co., at Plymouth, Mass., has made an assignment.

The Moore Manufacturing & Foundry Co., at Milwaukee, have made an assignment.

The Buckeye Foundry Co., at Cincinnati, O., have removed to their new quarters at Queen avenue and Buck street.

J. Herbert Newberry, who formerly operated a foundry at Guilderland, N. Y., has purchased the Goshen foundry at Goshen, N. Y., and will erect new buildings.

The Lansing Iron & Engine Works, at Lansing, Mich., which failed three years ago, has been re-organized and will be continued by the creditors.

The Murray Iron Works, at Burlington, Ia., have purchased the plant of the Corliss Engine Works at Sioux City and are removing it to Burlington.

Sjogren & Lund have purchased from T. H. Maurreth his foundry at St. Peter, Minn.

John Lavelle, foreman of the foundry of the Anderson Foundry & Machine Works, at Anderson, Ind., has purchased the Kenyoun brass foundry, at that place.

The Montgomery Iron Works, at Montgomery, Ala., that failed recently, has been reorganized as the Southern Iron Works, and hopes to do a greater business than ever.

The Union Trust Co. has been appointed a receiver to the American Malleable Iron Works, at Latrobe, Pa.

Orr, Painter & Co., at Reading, Pa., have had their stove foundry shut down for a year, but started up again a short time ago.

There is some talk of the pipe foundry at Chattanooga, Tenn., pouring their pipe direct from the blast furnaces. This much-talked-of plan is likely to be consummated sooner or later.

New Foundry Enterprises.

Augustus Mample is building a new foundry at Bath, Me.

The Greenspring Furnace & Foundry Co. will be a new concern at Greenspring, O.

G. Kratzmer is erecting a foundry at Bakersfield, Cal.

Wm. Birch has started a foundry at Crawfordsville, Ind.

The United States Radiator Co. are erecting buildings at West Newton, Pa.

David Davis has started a new foundry at Dillon, Montana.

Howard Cole will start a foundry at Shreveport, Texas.

The Wiles Manufacturing Co. will erect a foundry at Fultonville, N. Y.

S. Cheney & Son are enlarging their foundry at Manlius, N. Y.

Frank Hayes will erect a foundry at Superior, Wis.

Wm. Wright's new foundry at Watertown, Wis., has commenced operations.

J. B. Reed has his new foundry at Cairo, Ill., nearly completed.

The Union Foundry & Manufacturing Co. has been incorporated at Dayton, O. Capital $50,000.

There is some talk of a new foundry at Columbus, Ind. Messrs. Cook & Isgrigg, of Indianapolis, are the parties connected with it.

The Menominee Iron Works is building an iron proof foundry, 60x100, at Wausaukee, Wis.

Fire Fiend.

The Swett Iron Foundry at Medina, N. Y., suffered from a $1,000 fire May 1.

The Wilmington Pipe & Foundry Co. had a $1,000 fire recently.

At St. Louis, Mich., the foundry owned by A. and J. Rose, was burned May 26th. Loss $3,000.

The W. H. Wood foundry at West Troy, N. Y., was destroyed by fire June 5th, to the extent of $15,000.

A fire originated in the core room of the B. Hoffman Manufacturing Co.'s foundry at Milwaukee, May 14th, that caused $4,000 worth of damage before it was put out.

The Bethlehem Foundry & Machine Co. at Bethlehem, Pa., had a $2,000 fire recently.

W. Simpson had a $2,000 fire at his foundry, No. 911 South Forty-sixth street, Philadelphia, May 1st.

Wm. Henderson's foundry at New Brunswick, N. J., was destroyed by fire May 7th.

O. C. Olson's foundry at Massillon, O., was destroyed by fire June 14. Loss $10,000.

The Eagle Foundry at Lowell, Mass., was destroyed by fire June 3. Loss $6,000.

The foundry of the United Verdi Copper Co., at Jerome, Arizona, was destroyed by fire May 30th.

The foundry and buildings of the idle Denver Hardware Manufacturing Co., at Lakewood, Col., was destroyed by fire April 30th. Total loss and no insurance.

Pittsburg and Vicinity.

Business conditions during the early part of the month were dull, prices weak and unsatisfactory, and even up to the present time there has not been much improvement. The demand is confined mainly to the wants of the local trade, at prices which have prevailed for several weeks.

Stocks are large and are accumulating steadily. It is estimated that 10,000,000 tons of pig-iron are being produced yearly and the consumption is nothing like this figure. It is hardly possible for trade to be very buoyant under these conditions.

Last year at this time, saw an upward movement in values, which lasted until fall. Prices steadily advanced and transactions became very large. It is thought by some that a similar action will soon take place, but this has long been looked for.

Ohio furnaces have been doing the bulk of the business during the past few weeks, most of the sales extending the remainder of the year. Several heavy lots of Bessemer are under negotiation that may be closed at any time. The outlook is more favorable and, unless all indications fail, an active iron market may be expected in the near future.

Foundries in this section are being operated fairly full. There is plenty of work in the structural line, also for heavy castings for engines, etc. Through the Shenango valley, most of the foundries, both large and small, have a goodly number of men employed. Interviews with some of the proprietors brought out the statement that a regular trade is now almost at hand and that better prices are confidently expected.

The coke trade has shown nothing new, the demand being good one week and poor the next. The coke people have had their hopes of better things dashed so frequently that they are beginning to lose courage, particularly as the season has advanced thus far without showing an improved demand for finished material. Without an improvement in this line, means no increase in the coke business, with many chances of a decrease. Should the reported shut-down among the furnaces become a reality, there will be a big drop in the coke industry. In spite of the decreasing volume of trade, prices are still well sustained with furnace coke at $2; foundry and crushed at $2.30 f. o. b. at ovens.

Cast Iron Pipe.—Foundries are pretty well employed at present as the demand, within the past few weeks, has increased considerable. Prices are also steady and being well maintained.

Rolling Mill Castings.—There has not been any noticeable change in this branch of the trade. Some contracts are being placed, but they are not of much consequence. Prices rule about as follows:

	Cents Per lb.
Chilled rolls, up to 12 inches	3¾
Chilled rolls, over 12 inches	3¼
Sand rolls and pinions, up to 12 inches	2¾
Sand rolls and pinions, over 12 inches	2¼
V tooth pinions, additional	¼
Housen and rolling mill castings	2
Squeezer castings	2
Squeezer pinions and wheels	2½
Spur and level wheels, large	4
Spur and level wheels, small	3

The Minnemeyer Manufacturing Co., of Allegheny, has been placed in the hands of a receiver. The company has been unable to meet its obligations owing to the depressed condition of the iron business.

The Pultney Foundry and Engineering Company, of Youngstown, has succeeded to the business of the Pultney Foundry and Engineering Works, and at a recent meeting of the stockholders the following officers were elected: President, Wm. Pultney; vice-president, Robert Gray; secretary, Robert Gibson; treasurer and general manager, Robert Pultney.

The contract for the machinery of the four additional mills to be erected by the Elliott-Washington Steel Company at New Castle has been awarded to the Scaife Foundry and Machine Company, of Pittsburg. The new mill will be in operation by the middle of August and will be devoted to the production of high grade bright cold rolled strip steels.

The Aetna Foundry and Machine Company, Warren, O., has progressed sufficiently far with its improvements to handle orders with facility. Several new machines have been added to the machine shop, and the capacity of the foundry increased. Further improvements are being made.

Texas Foundrymen's Association.

The Texas Foundrymen's Association held their last meeting in Galveston, Texas, June 10th.

Secretary W. S. Mosher gave a detailed report of the organization of the American Foundrymen's Association in Philadelphia, and it was unanimously decided on the part of those present that it would be well to cooperate with the National Association as closely as possible.

After the transaction of routine business a very interesting paper was read by Mr. James T. Fuller, manager of the Fuller Engineering Co., of Calvert, Texas, entitled "The development of Texas Iron Products," and at its close its author received many compliments from those present.

Mr. J. B. Ramp, a well-known foundryman in charge of the Murray Iron Works at Burlington, Ia., has designed a penumatic molding machine that is said to give the best of satisfaction.

It is said that the Tennessee Coal, Iron & Railroad Co. has contracted with a firm at Genoa, Italy, to deliver the latter 50,000 tons of low silicon pig-iron annually for a term of years.

J. A. Fay & Egan Co., the justly celebrated manufacturers of wood-working machinery of Cincinati, have received, in the face of the strongest European and American competition, a large order for locomative and railway car shop tools for Russia. This order, amounting to over ten thousand dollars, is especially gratifying inasmuch as, being the second received during the course of a few years, it shows the high esteem in which the machines are held and the splendid reputation they have gained for themselves.

Foundry Mention.

Taylor Brothers, of Sharon, have secured the contract for the erection of the new foundry to be erected at Sharpsville, by Messrs. Rose and Palmer, in place of the one burned down recently.

The Falcon Bronze Company, of Youngstown, has enough orders on hand to run them for some weeks ahead, and is at present engaged in filling a large order for brass moldings for the Great Western Tin Plate Company, of Joliet, Ill.

The Aschmann Steel Casting Company, of Sharon, Pa., has announced a reduction in laborers' wages from $1.35 to $1.25 a day. The wages of skilled laborers will also be reduced, but individual contracts will be made. A portion of the working force was temporarily laid off recently, owing to lack of orders.

The Girard Stove and Foundry Company, of Youngstown, expects to have its new 15-ton air furnaces completed in three weeks. The company has all the work it can possibly handle for the present and is arranging to better facilitate the manufacture of rolls.

The court has made an order allowing R. C. Totten, receiver of the Carlin Manufacturing Company, of Allegheny, to enter into an agreement with the creditors to continue the business of the company. The proceedings in the case of W. J. Brennen against the Carlin Manufacturing Company were suspended.

The Blackham Manufacturing Company has been organized at Zelienople by Wm. M. C. Jones, J. R. Rose, and Siras and Geo. Blackham, with a capital of $60,000, to manufacture all kinds of enameled goods. A plant is now under course of erection which will be built of steel and brick and equipped with all modern appliances. The works will consist of a foundry 90x150; warehouse, 60 x150; enameling room, 70x80; pickling room, 50x58; and mixing house, 30x60.

Wm. Tod & Co., of Youngstown, have just completed what is said to be the largest engine ever constructed in Northern Ohio for the Monongahela Furnace Company, of McKeesport, Pa. The engine is of the compound condensing type and weighs 375 tons. It has a 40-inch high pressure cylinder, a 76-inch low pressure, 76-inch blowing tubs and all have a 60-inch stroke. It is calculated to blow a pressure of 25 pounds. The flywheels are 24 feet in diameter and each weighs 50 tons.

Julius Goldschmidt, second vice-president of the National Association of Stove Manufacturers, and vice-president of the Brand Stove Company, Milwaukee, Wis., has resigned his position with the company on account of ill health.

The Gibson Foundry & Machine Company, Gibson, N. B., has been incorporated. Capital stock, $200,000.

The Southern Malleable Iron Company at Chattanooga, Tenn., recently acquired by the Ross-Mehan Brake Shoe Company, is being thoroughly refitted. The furnaces and ovens are being practically rebuilt, under the superintendence of Mr. Charles Herron, of the Ross-Mehan Co.

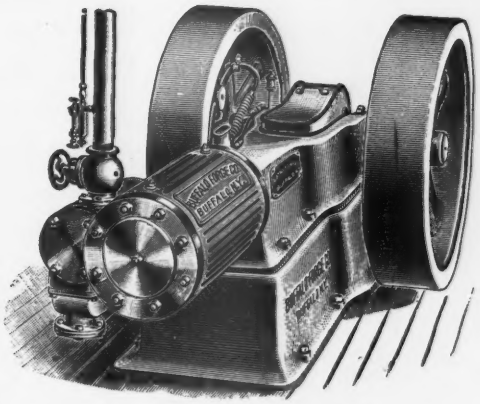
The Michigan Peninsular Car Co., of Detroit, Mich., have placed a contract with The Berlin Iron Bridge Co., of East Berlin, Conn., for a new foundry building, 160 feet square. This building is one story high, has a steel frame work throughout, and is so designed that the lower chords of the trusses support runways extending the whole length of the building. These runways carry trolleys having a capacity of 2,000 pounds. By means of these overhead trolleys the molten metal is conveyed quickly and easily from the cupolas to any part of the casting floor.

The Lloyd Booth Company, of Youngstown, intends to engage more largely than ever in the manufacture of rolling mill steel works and special machinery. With this end in view, it has purchased additional ground and expects to erect a new machine and erecting shop. The building will be of steel and brick 140 feet long, main span 60 feet wide, with a two-story lean-to 30x120 feet. Contracts have been placed for a large portion of the equipment. A new air furnace will also be added to the foundry department, and when these improvements are completed the plant will have more than double its present capacity. The company has secured the services of Mr. S. V. Huber, a mechanical engineer of wide experience, who, until purchasing stock in the company, was a consulting and contracting engineer located in Pittsburg.

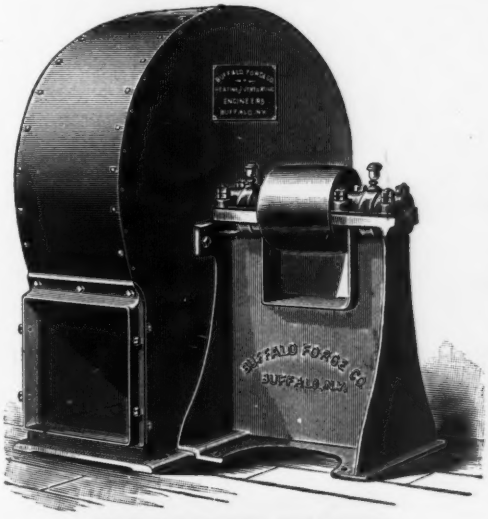
CUPOLA BLOWER.

For the latest development in Cupola Blower construction and application, see BUFFALO FORGE Co.'s 1896 Sectional Catalogue, "America's Best, the World's Standard."

BUFFALO FORGE Co.'s Automatic Cut-off Engine, Horizontal and Upright types for Electric Lighting and Power purposes, direct connected or belted. 1896 Sectional Catalogue furnishes full details.



CLASS "A" HORIZONTAL.

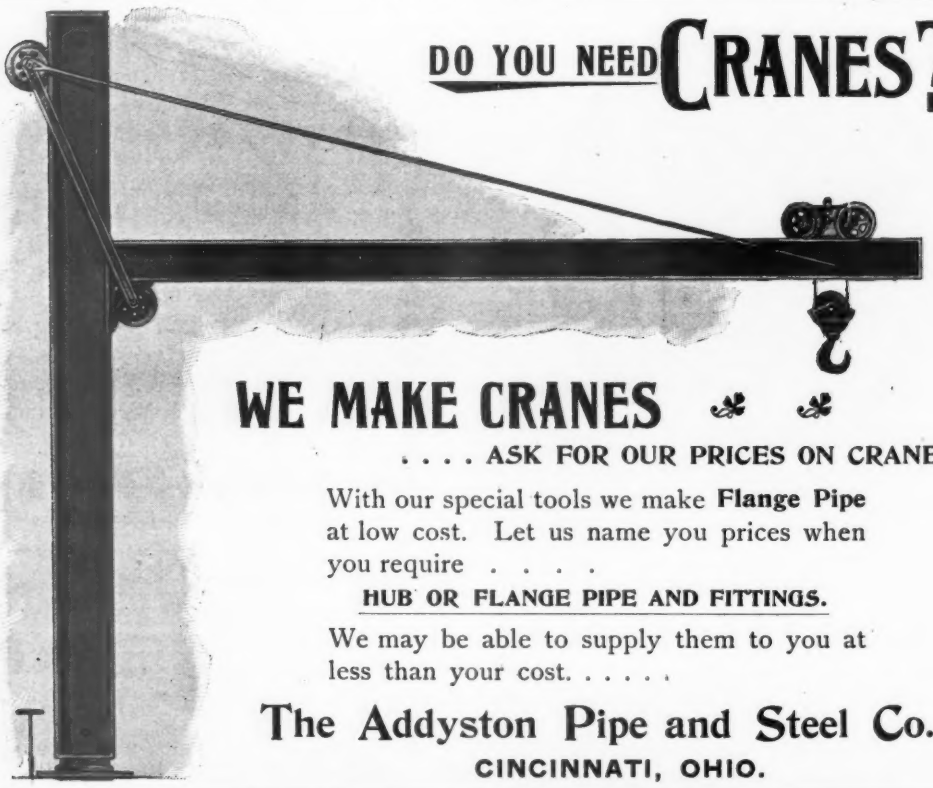


TUMBLING BARREL EXHAUSTER.

Tumbling Barrel Exhausters are easily applied, thoroughly efficient, and change casting cleaning rooms from a death-dealing pestilence to a comfortable working apartment. Send for details.

BUFFALO FORGE CO.,
BUFFALO, N. Y., U. S. A.

CHICAGO, 22-24 W. Randolph St. NEW YORK, 26 Cortlandt St.



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WE MAKE CRANES

. . . . ASK FOR OUR PRICES ON CRANES

With our special tools we make **Flange Pipe** at low cost. Let us name you prices when you require . . . .

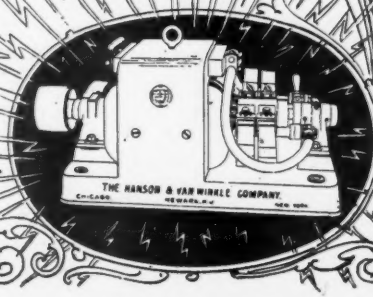
HUB OR FLANGE PIPE AND FITTINGS.

We may be able to supply them to you at less than your cost. . . . . .

The Addyston Pipe and Steel Co.

CINCINNATI, OHIO.

NICKEL-PLATING OUTFITS



THE HANSON & VAN WINKLE -COMPANY.-

NEWARK, N.J.

CHICAGO. NEW YORK.

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THE FOUNDRY

The only foundry paper published in the world, and an authority on all matters pertaining to the foundry business.

RATES OF SUBSCRIPTION.

Single subscription to all parts of the United States and Canada, $1 per annum.
" " Universal Postal Union, 1.75 "
Eight or more subscriptions at one time, 75 cents each.

ADVERTISING RATES.

One page	- -	per month, $20.00
Half page	- - -	" 12.00
Quarter page	- -	" 7.00

When space is specified an extra charge of five per cent. on the above figures will be made. All pages between front cover and reading matter reserved for whole page advertisements.

Advertisers in THE FOUNDRY have the privilege of discontinuing their advertisements at any time after they have had three insertions, and will only be charged pro rata for the number of insertions printed. They also have the privilege of changing advertisements as often as desired.

The publishers of THE FOUNDRY appreciate the fact that it is customary for publications, especially the class known as Trade Journals, to quote a rate for advertising from which greater or less discounts are given, according to the persistency of the advertiser. This system is manifestly unfair as tending to show partiality. We have deducted the usual discount before quoting rates thus giving it to all alike, and no reduction of any sort on the abov rates can be made.

Copy for advertisements should be in by the 25th of the month preceding publication.

All Moulders Should Have Them

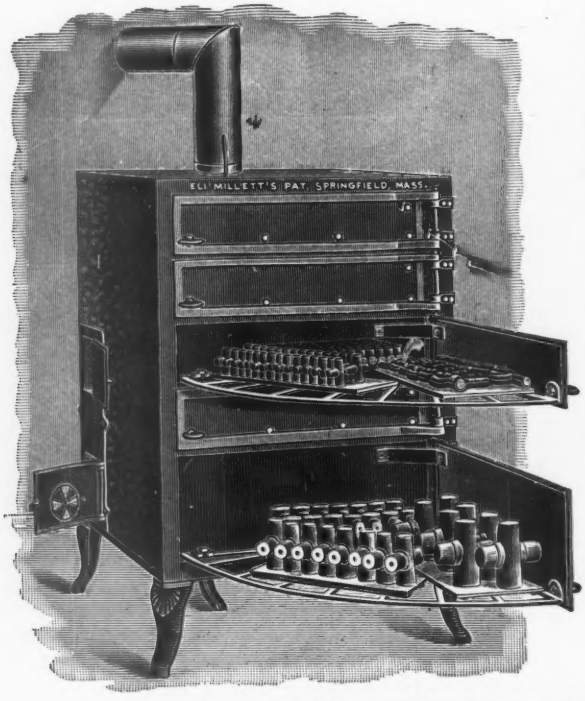
RUBBER TIPPED FOUNDRY RAMMERS

FOR FLOOR OR BENCH.

They do not mar or break the patterns. Their use also often saves time, as less care is needed for the patterns, and care means time and money. The moulds are as good and require as little venting as moulds made by ordinary rammers. We believe they are superior in these respects. Some who use the rubber tips think they save labor, as they tend to lift the Rammer at the beginning, the hardest place in the backward part of the stroke. However this may be, they certainly save patterns. Try them.

PRICE of Floor Rammer, 85c.
Bench Rammer, 70c..
Handles included.

Brown & Sharpe Mfg. Co.,
PROVIDENCE, R. I.



Millett's Patent Core Oven

THE BEST IN THE WORLD.

No Foundry using small Cores can afford to be without it.

Over one hundred and fifty in use.

SEND FOR OUR NEW CATALOGUE GIVING NAMES OF THOSE USING THEM.

Millett Core Oven Co.
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For Sale by J. W. PAXSON & CO. Philadelphia, Pa.

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Cowles Electric Smelting & Aluminum Co., Lockport, N. Y.

AIR HOISTS.
Whiting Foundry Equipment Co., Harvey, Ill.

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Lansing Wheelbarrow Co., Lansing, Mich.

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Buffalo Forge Co., Buffalo. N. Y.
Connersville Blower Co., Connersville, Ind.
Garden City Fan Co. Chicago, Ills.
Root, P. H. & F. M. Company, Connersville, Ind.
Sturtevant Company, The B. F., Boston, Mass.
Wilbraham Baker Blower Co., Philadelphia, Pa.

BRONZES.
Cowles Electric Smelting and Aluminum Co., Lockport, N. Y.

CHARCOAL.
Springfield Facing Co., Springfield, Mass.

COKE.
Washington Coal and Coke Co., 7 Wood St., Pittsburg, Pa.

CORE COMPOUNDS.
American Glutrose Works, Philadelphia, Pa.
Stewart, W. H., 182 Front St., New York.
Vreeland Tompkins, Jersey City, N. J.

CORE OVENS.
Millett Core Oven Co., Brightwood, Mass.

CORE OVEN CARS.
Lansing Wheelbarrow Co., Lansing, Mich.
Kilbourne & Jacobs Mfg. Co., Columbus, Ohio.
Foundry Outfitting Co., Detroit Mich.
Whiting Foundry Equipment Co., Chicago.

CRANES.
Addyston Pipe and Steel Co., Cincinnati, O.
Craig Ridgway & Sons, Coatesville, Pa.
Harrington, E., Sons & Co., Philadelphia, Pa.
Phœnix Iron Works Co., Cleveland, Ohio.
Shaw Electric Crane Co.
Wm. Sellers Co.
Whiting Foundry Equipment Co., Harvey, Ill.

CRUCIBLES.
Joseph Dixon Crucible Co., Jersey City, N.J.
McCullough-Dalzell Co, Pittsburg, Pa.
Taylor Crucible Co., Robt. J., Philadelphia, Pa.

CUPOLAS.
Foundry Outfitting Co., The, Detroit, Mich.
Springfield Cupola Co., Springfield, O.
Whiting Foundry Equipment Co., Harvey, Ill.

FIRE-BRICK.
Brooklyn Fire Brick Works, Brooklyn, N. Y.
Garden City Sand Co., Chicago, Ill.
Obermayer Company, The S., Cincinnati, Ohio
Paxson, J. W., & Co., Philadelphia, Pa.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.

FLEXIBLE SHAFTS.
Stow Flexible Shaft Co., Binghamton, N. Y.
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FOUNDRY LADLES.
Foundry Outfitting Co., The, Detroit.
Obermayer Company, The S., Cincinnati, Ohio.
Paxson & Co., J. W., Philadelphia, Pa.
Phœnix Iron Works Co., Cleveland, Ohio.
Smith Foundry Supply Company, The J. D., Cincinnati, Ohio.
Whiting Foundry Equipment Co., Harvey, Ills

FOUNDRY PLANS.
Foundry Outfitting Co., The, Detroit, Mich.
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FOUNDRY SUPPLIES.
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Springfield Facing Co., Springfield, Mass.
Foundry Outfitting Co., The, Detroit, Mich.
Joseph Dixon Crucible Co. Jersey City, N J.
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Obermayer Company, The S., Cincinnati, Ohio
Paxson & Co., J. W., Philadelphia, Pa.
Smith Foundry Supply Co., Cincinnati, O.
The U. S. Graphite Co., Saginaw, Mich.
Whitehead Bros. Co., New York.

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Berlin Iron Bridge Company, East Berlin, Conn
Wrought Iron Bridge Company, Canton, Ohio.

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Foundry Outfitting Co., The, Detroit.
Garden City Sand Co., Chicago, Ill.
Paxson & Co., J. W., Philadelphia, Pa.
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Hanson & Van Winkle Co., Chicago.

PATTERN FILLETS.
Canton Fillet Co. Canton, Ohio.

PATTERN MAKERS.
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PATTERN MAKERS SUPPLIES.
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The J. A. Fay & Egan Co., Cincinnati, Ohio.
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Hanson & Van Winkle Co., Chicago.

POLISHERS SUPPLIES.
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Wm. Sellers & Co., Philadelphia, Pa.
Taylor, Wilson & Co. Allegheny, Pa.

SAND BLAST.
Goodrich, & Co., F. A., Detroit, Mich.

SNAP FLASKS.
Diamond Clamp & Flask Co, Richmond, Ind.
Green & Co., C. H., Syracuse, N. Y.

SPRUE CUTTERS.
Gould & Eberhardt, Newark, N. J.

TROLLEY TRACKS.
Coburn Trolley Track Mfg. Co., Holyoke, Mass.

TUMBLING BARRELS.
Brown & Sharpe Mfg. Co., Providence, R. I.
Paxson & Co., J. W., Philadelphia, Pa.
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Tubular Steel Tray Barrows.

STYLE A 2 TO A 8. Fig. 253.

PAINTED BLUE.

The trays of these barrows are made of one piece of steel, of the same thickness throughout The expense of repairing wooden barrows is greater than the original cost, and the loss of time so increases the expense that the steel barrow is cheaper in the end.

These barrows are made to dump forward, and are so constructed that at the dumping point they will not run back on the operator.

The wheels are made with gray iron hubs with round iron spokes shouldered at tire, passing through and riveted on outside. It is impossible for the spokes to become loosened from either tire or hub. Tires 1¾ in. wide. Wheels revolve on ⅝ in. bolt through hub.

Write for circulars and prices. We make all styles of warehouse trucks and wood and steel barrows.

LANSING WHEELBARROW CO., LANSING, MICH.

AIR * COMPRESSORS

IN FOUNDRIES

High Grade Compressors

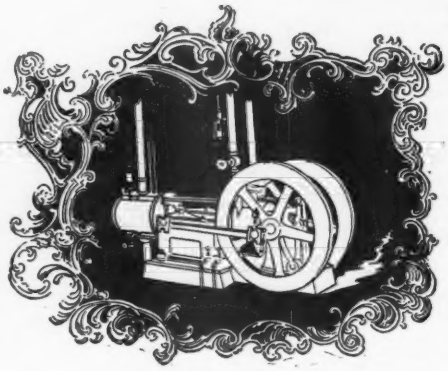
Steam or Belt Driven

Manufactured by

THE

Ingersoll-Sergeant Drill Co.

Havemeyer Building, New York.



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Made throughout of the best quality of high grade steel. Tray stamped without joint, seam or rivet, with edge bound over steel rod. Handles, Legs and Wheels the strongest put upon Tubular Barrows.

Made in nine different sizes. Largest manufacturers in the United States of TUBULAR BARROWS, STEEL CHARGING BARROWS and WOODEN BARROWS of every variety. Write for catalogue to

The Kilbourne & Jacobs Manufacturing Co.

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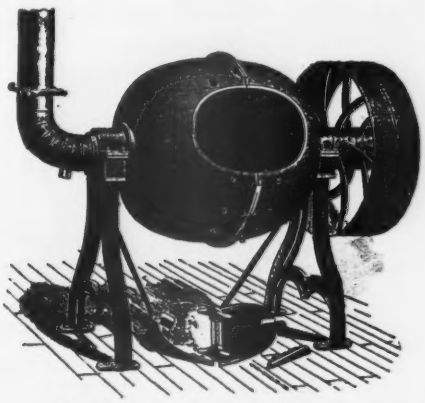
EXHAUST TUMBLING BARREL



The Stover Egg Shaped Barrel does double the work of any other with less noise and power. It gives the contents a double motion or action—from ends to center and from side to center—causing a thorough mixing and rubbing together of all the parts contained therein, cleaning and polishing the contents better and quicker than any other form of barrel.

Sent on 30 days approval to any responsible manufacturer of light castings, malleable iron wire nails, or any other small articles that require cleaning and polishing.

For full particulars, address,

Stover Manufacturing Co.

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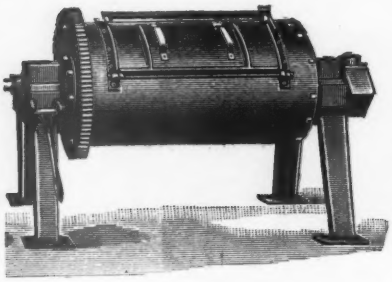
SEVERAL PEOPLE . . .



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TUMBLED

Their Castings by our Improved Method, much to their satisfaction and profit.

You are in business for Profit, and money saved is money earned.

Send for Catalogue of our IMPROVED MILLS.

CLEVELAND NICKEL WORKS,

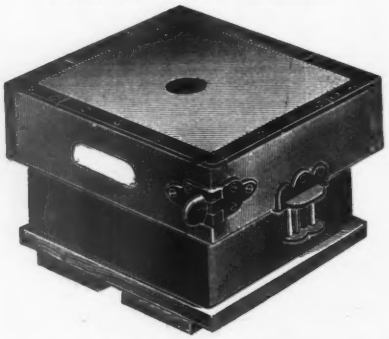
CLEVELAND, OHIO.

MANUFACTURERS OF

IMPROVED TUMBLING MILLS and STOVE RODS, SCRAPERS, POKERS, TOWEL RODS and NICKEL PLATED STOVE TRIMMINGS.

Boutelle's Improved Snap Flask

FOR HEAVY WORK.



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NO STRAINING OF WORK.

SAVES Floor Space
SAND
TIME
MONEY

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L. W. BOUTELLE,
ORANGE, MASS.

Eberhardt's Patented Sprue or Gate Cutter

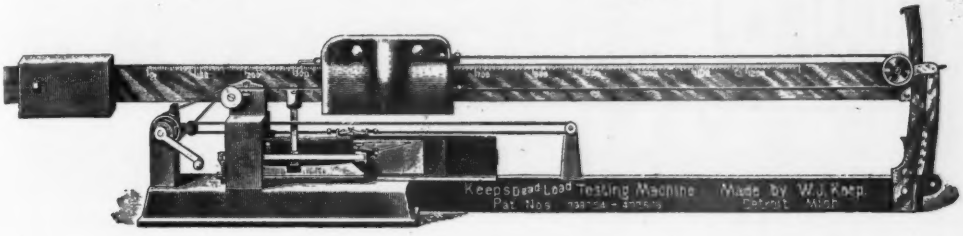
Dear Sir :—The machine fills the bill; am just delighted with it. Yours truly, Maryland Brass & Metal Works, Baltimore, Md.

Price Low

Send to

GOULD & EBRHARDT, NEWARK, N. J.

"Keep's Test" Apparatus.



HERE IS WHAT ONE LARGE CONCERN SAYS:-IT HAS PAID THEM, WHY NOT YOU?

DETROIT, MICH., March 31st, 1896.

Mr. W. J. Keep, City:

DEAR SIR: We have regulated our foundry mixture by "Keep's Test" during the past year, and can recommend it in highest terms. We know exactly what we are doing and can keep our castings of uniform quality. We find that .160 inches per foot the best shrinkage, and have been able to keep the average strength of a test bar ½ inch square and 12 inches long at 450 pounds.

Very truly yours,
LELAND & FAULCONER MFG. CO.,
H. M. LELAND, Vice-President.

TO SAVE MONEY IN YOUR OWN FOUNDRY, ADDRESS **W. J. KEEP, Detroit, Mich.**

90 Heats

That's what some of the

HUSSMAN CRUCIBLES STAND

NOW! A few years ago, could not say so truthfully. We defy competition in quality and durability. We use Choicest **CEYLON PLUMBAGO** hence can sell you the best for Facings.

Try us. Send for testimonials.

HUSSMAN CRUCIBLE CO

810 Commercial Bldg., ST. LOUIS, MO.

STOW MF'G. CO.

BINGHAMTON, N. Y.

INVENTORS AND MANUFACTURERS OF THE

STOW FLEXIBLE SHAFT

—FOR—

PORTABLE
DRILLING
TAPPING
REAMING
WOOD BORING
EMERY GRINDING
BICYCLE DRILLING, ETC.

PORTABLE EMERY GRINDER

This tool is almost indispensible for cleaning and grinding heavy castings, buffing and polishing all metals and glass. It runs Emery Wheels, either flat or on edge. Hundreds in use giving perfect satisfaction.

General European Agents,
SELIG SONNENTHAL & CO,
85 QUEEN VICTORIA STREET,
LONDON, ENGLAND.

Write for Catalogue and Price List.

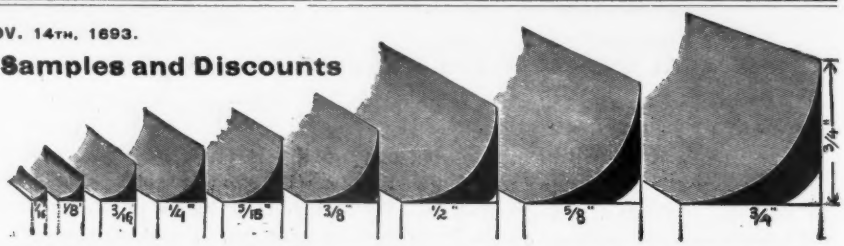
PATTERNS FOR CASTINGS.

ANYTHING, from a Toy Pistol to a Steel Plant.
Largest Pattern Works in the World.

The Gobeille Pattern Co., Cleveland, O.

PATENTED NOV. 14TH, 1893.

Write for Samples and Discounts



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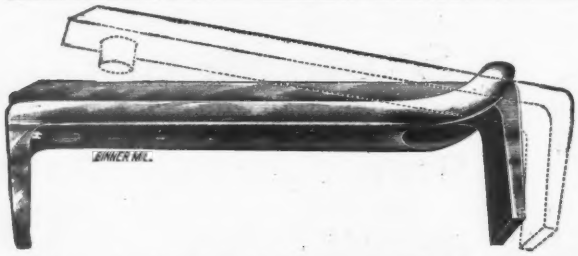

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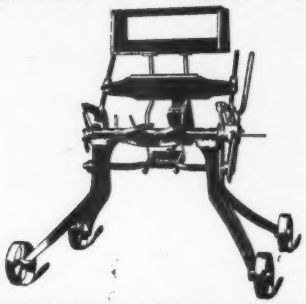

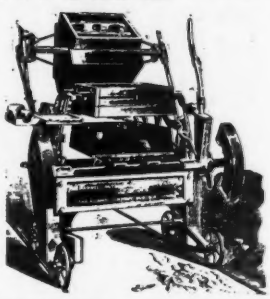

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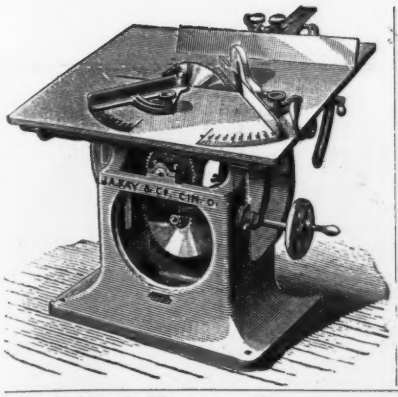

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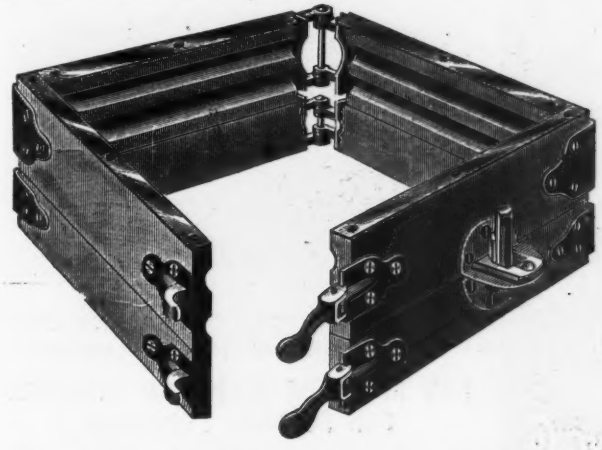

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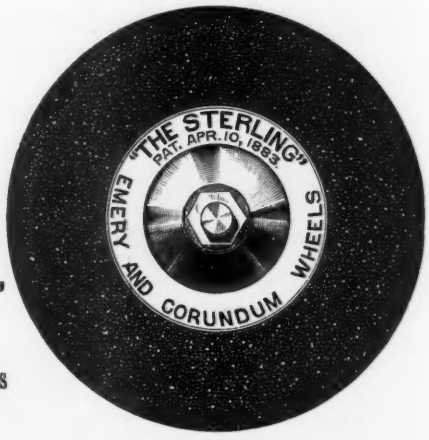

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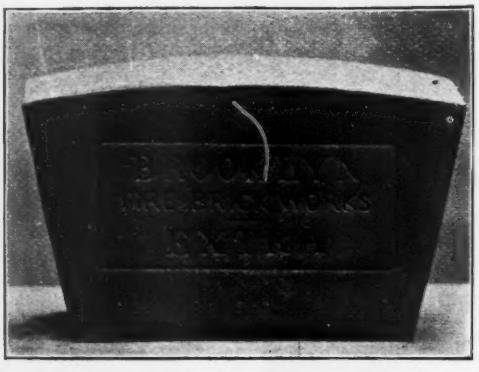

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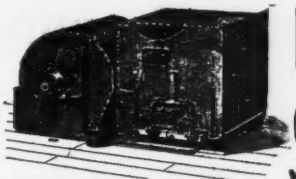

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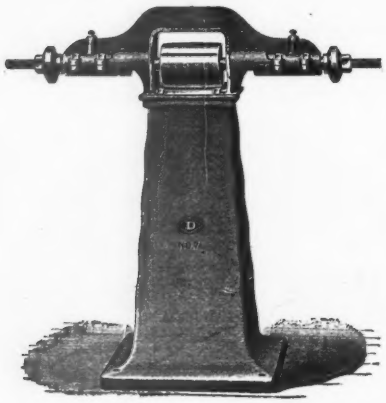

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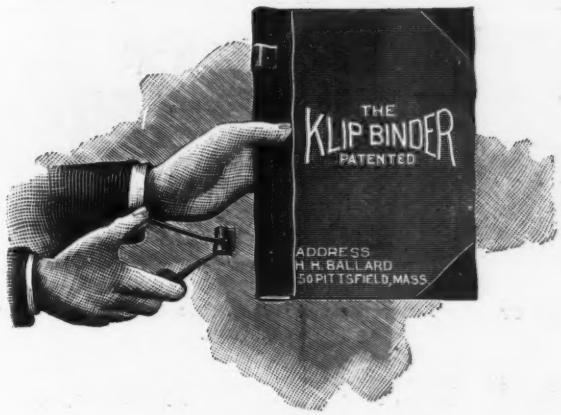

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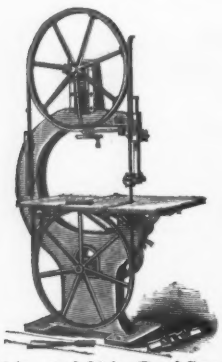

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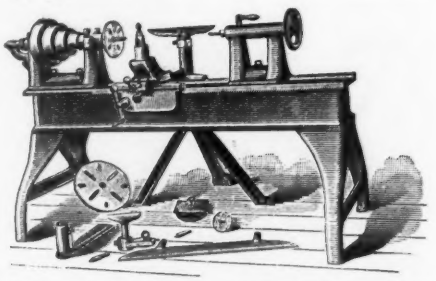

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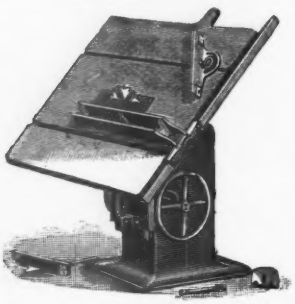

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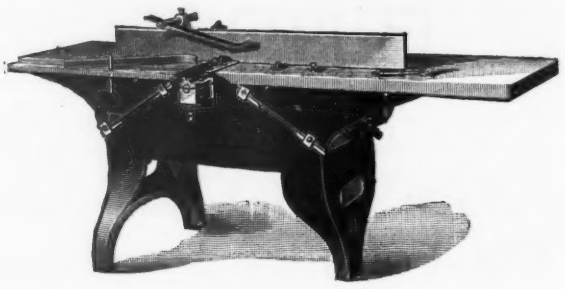

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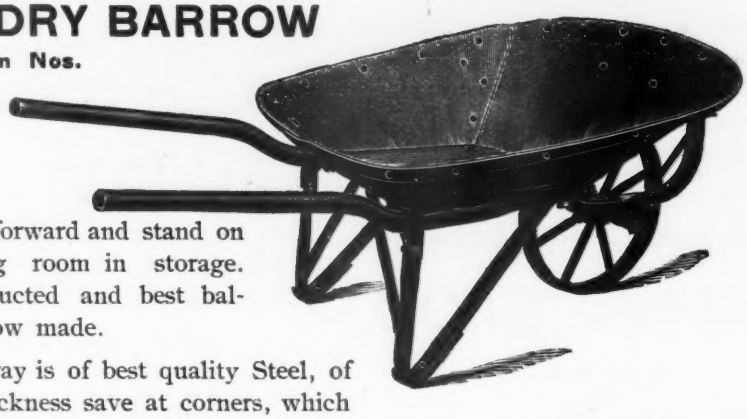

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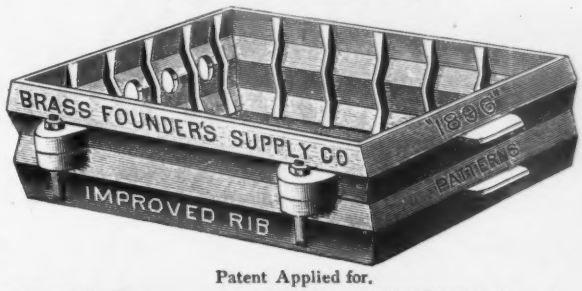

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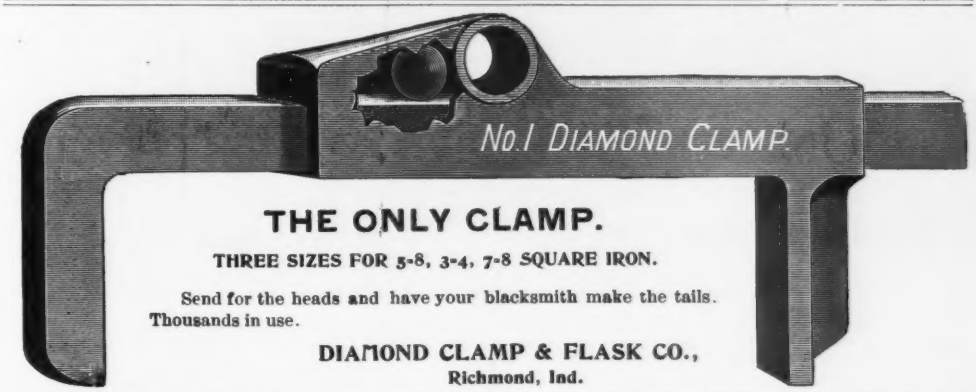

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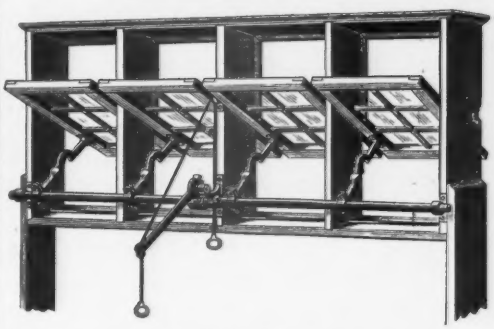

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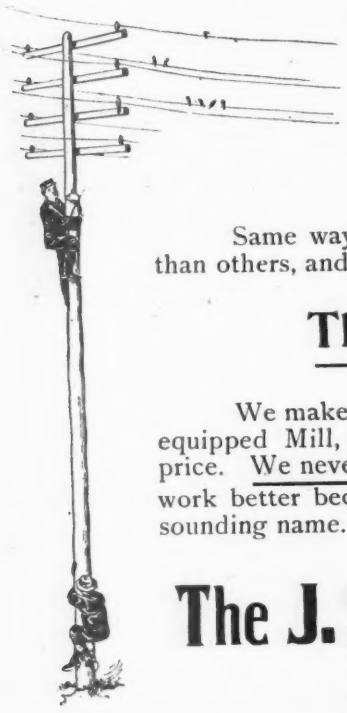

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